

13665



# HYDE COUNTY

## Land Use Plan

HD  
211  
.N8  
C36  
1976

CAMA  
1976

N.C. CONSTITUTION  
RESOURCES  
COMMISSION



13665

Hyd. 118 226  
1976



A LAND DEVELOPMENT PLAN

FOR

HYDE COUNTY, NORTH CAROLINA

MAY, 1976

IN ACCORDANCE WITH:

THE 1974 NORTH CAROLINA COASTAL AREA MANAGEMENT ACT

THE PREPARATION OF THIS DOCUMENT WAS FINANCED IN PART THROUGH  
A PLANNING GRANT FROM THE NATIONAL OCEANOGRAPHIC AND  
ATMOSPHERIC ADMINISTRATION.

N.C. COASTAL RESOURCES COMMISSION

US Department of Commerce  
NOAA Coastal Services Center Library  
2234 South Hobson Avenue  
Charleston, SC 29405-2413

THIS REPORT HAS BEEN PREPARED FOR THE RESIDENTS OF  
HYDE COUNTY, NORTH CAROLINA

BOARD OF COMMISSIONERS

J. B. Berry, Chairman

Eddie O'Neal

Mitchell P. Newman

Clifford Swindell, County Coordinator

LAND USE COORDINATING COMMITTEE

Leon Ballance  
Charlie Carawan  
Howard Clayton  
Bennett Emory  
Hank Harvey

June Liverman  
Richard Mann  
David O'Neal, Sr.  
Betty Potter

COUNTY LAND USE COMMITTEE

H. L. Ballance  
Kirby Ballance  
Billy Batchelor  
John H. Brickhouse  
Robert Bryant  
Carl Cahoon  
Joyce Carawan  
Roy Clarke  
Edward Lee Clayton  
Scot Coble  
Jimmy Dunbar  
Alex Eley  
David Esham  
C. J. Gibbs  
Lee Dale Gray

Don Green  
Phillip Greene  
Morgan Harris  
Donald Harris  
Wade Hubers  
Al Hubers  
Elmer Hubers  
Tommy Jones  
Bill Lawrence  
Pat Leigh  
Leewood Lupton  
Dan McInnis  
George O'Neal  
James Roberts

Roger Shannon  
Joe L. Simmons  
Ben Simmons  
Leonard Smith  
Ross Smith  
Ben Smith  
Betty Spencer  
Gratz Spencer  
Roger A. Spencer  
R. S. Spencer  
Roland Tooley  
Frank Wardlow  
Thurman Whitley  
Joe Williams  
Jack Willis

PROJECT STAFF:

Robert H. Loomis, Community Planner  
Debra Ingalls, Secretary  
Mary Noe, Secretary  
Patricia Sheppard, Secretary  
Danny Smith, Draftsman  
Mike Yount, Draftsman

## TABLE OF CONTENTS

<u>TOPIC</u>	<u>PAGE</u>
Cover Page	i
Table of Contents	ii - iv
List of Tables	v
List of Maps	vi
List of Figures	vii
Introduction	1
Existing Conditions	7
Population	8
Economy	17
Existing Land Use	21
Implications for the Future	34
Areas Likely to Experience Growth	37
Current Plans and Policies	38
Water Facilities	39
Transportation	45
Recreation	47
Open Space	47
Land Use Plans	48
Land Use Policies	48
Zoning Ordinance	48
Subdivision Regulations	48
Floodway Ordinances	48
Building Codes	48
Septic Tank Regulations	48
Historic District Regulations	49
Nuisance Regulations	49
Dune Protection Ordinances	49
Sedimentation Codes	49
Environmental Impact Statement Ordinances	49
Public Participation	50
Future Population, Economic Trends	51
Housing and Services	53
Conservation of Natural Resources	54

Protection of Natural Environments	58
Land Use Objectives, Policies and Standards	59
Public Participation Program	63
Constraints Upon Development	68
Physical Limitations	69
Natural Hazard Areas	70
Soil Limitations	74
Water Supply Areas	79
Fragile Areas	82
Coastal Wetlands	83
Estuarine Waters	87
Public Trust Waters	90
Remnant Species	94
Complex Natural Areas	97
Areas With Resource Potential	97
Prime Agricultural Lands	98
Drainage	101
Mineral Sites	112
Public Forests and Parks	113
Capacity of Community Facilities	117
Sewage System	118
Water Facilities	119
School Facilities	120
Primary Roads	124
Estimated Demand	127
Population Projections	127
Carrying Capacity	131
Economic Projections	132
Future Land Needs	136
Residential	136
Commercial	138
Industrial	139
Agricultural	140
Forestry	140
Future Community Facilities	142

Plan Description	145
Land Classification System	146
Areas of Environmental Concern	153
Coastal Wetlands	155
Estuarine Waters	156
Public Trust Waters	158
Natural Hazard Areas	159
Complex Natural Areas	160
Conclusion	161
Bibliography	167

# LIST OF TABLES

<u>Table Number</u>		<u>Page Number</u>
TABLE I	HYDE COUNTY POPULATION 1900 - 1970	9
TABLE II	HYDE COUNTY 1970 POPULATION DISTRIBUTION	10
TABLE III	POPULATION BY TOWNSHIP AND AGE GROUP	12
TABLE IV	MEDIAN FAMILY INCOME	17
TABLE V	FAMILIES BY POVERTY STATUS	18
TABLE VI	COUNTY LABOR FORCE	19
TABLE VII	HYDE COUNTY HOUSING UNITS	22
TABLE VIII	AGRICULTURAL PRODUCTION 1960 - 1970	24
TABLE IX	HYDE COUNTY RETAIL SALES	27
TABLE X	HYDE COUNTY COMMERCIAL FOREST LAND	31
TABLE XI	HYDE COUNTY SOIL INTERPRETATIONS	77
TABLE XII	HYDE COUNTY POPULATION PROJECTIONS	128
TABLE XIII	HYDE COUNTY POPULATION PROJECTIONS BY TOWNSHIPS	129
TABLE XIV	CIVILIAN LABOR FORCE, PERCENT EMPLOYMENT BY ACTIVITY	133



## LIST OF MAPS

<u>Map Number</u>	<u>Description</u>	<u>Page Number</u>
MAP 1	LOCATION OF HYDE COUNTY	2
MAP 2	TOWNSHIPS WITHIN HYDE COUNTY	11
MAP 3	WATER SERVICE AREAS	41
MAP 4	FISHING WATERS OF HYDE COUNTY	56
MAP 5	SHORE EROSION FOR HYDE COUNTY	72
MAP 6	COUNTY SOILS DISTRIBUTION	76
MAP 7	FRAGILE AREAS	84
MAP 8	CLOSED FISHING WATERS	88
MAP 9	STREAM CLASSIFICATION	92
MAP 10	WILDLIFE REFUGE IDENTIFICATION	115
MAP 11	COMMUNITY FACILITIES	121

## LIST OF FIGURES

<u>Figure Number</u>	<u>Description</u>	<u>Page Number</u>
FIGURE 1	TYPICAL ARTIFICIAL DRAINAGE SYSTEM	105
FIGURE 2	SEASONAL GROUND WATER FLOW CONDITIONS	107

## INTRODUCTION



## Introduction

This document is the Land Use Development Plan for Hyde County, North Carolina, resulting from legislation enacted by the North Carolina General Assembly, G.S. 113A-100, The Coastal Area Management Act of 1974. Upon enactment, responsibility for directing the land use planning efforts within the twenty coastal counties of the state was delegated to the Coastal Resources Commission and the Coastal Resources Advisory Council.

The purpose of the Coastal Area Management Act is to develop a comprehensive plan for the protection, preservation, orderly development, and management of the coastal area. The Act requires that each coastal county develop a land use plan, incorporating long-range goals and methods by which needed or desired growth may occur, at the same time recognizing the capacity of the land and water to sustain such growth. The Coastal Resources Commission adopted the State Guidelines for Local Planning in the Coastal Area under the Coastal Area Management Act of 1974.

Hyde County is located in the coastal plain of North Carolina, encompassing the southeast quadrant of the peninsula which separates the Pamlico and Albemarle sounds. More specifically, the county is bounded by the Pungo River and Beaufort County on the west, Washington and Tyrrell and Dare counties on the north, and the Pamlico Sound on the south and east. Unlike most counties, however, Hyde consists of two distinct sections, the mainland portion, previously described, and the Island of Ocracoke.

Located approximately thirty (30) miles southeast, across Pamlico Sound from the mainland, Ocracoke forms a portion of the famous Outer Banks of North Carolina. A majority of the island's area is part of the Cape Hatteras National Seashore. The county, therefore, represents divergent and complex land use patterns and interests.

#### Public Participation

In January, 1975, the local planning effort was initiated. The published guidelines stressed the concept of public participation, emphasizing a desire of the process was to achieve the maximum possible degree of public participation by residents in the design and development of the plan. Therefore, residents of the county have been encouraged to make the basic determinations regarding future land use policies of the county based upon their perceptions of the county's future requirements and existing inadequacies. To coordinate the county's effort, the Board of County Commissioners contracted with the North Carolina Department of Natural and Economic Resources' Division of Community Assistance for a professional planner. Preliminary discussions were held to discuss with the elected officials and community leaders methods by which the plan could be developed. In accordance with the guidelines, the role of the professional planner was designated as a facilitator for public participation, organizing citizens, providing technical assistance and serving as an interpreter of the Coastal Resources Commission's guidelines.

In anticipation of the guidelines' requirements for substantial public participation, the County Board of Commissioners designated that a county-wide citizen organization be established named the Hyde County Land Use Committee. This group evolved to become the nucleus of the citizen planning effort in the county.

Early in the planning process, it became apparent that it was impractical to assume that one person would have a specific knowledge of the entire county; thus, the committee was divided into subcommittees, along township lines. The role of the subcommittees was to develop and recommend adoption of the county-wide standards and policies.

While the township committees became the focal point of the planning effort, this was not to the exclusion of the remaining county residents. The planner, along with members of the township committees met, with local civic organizations, single purpose groups and open public meetings to discuss the planning effort, the benefits of a land use plan; and the concept that a land use plan is a flexible foundation for the future development and conservation of the county's natural resources.

Recognizing the time constraints established by the Commission's guidelines and the limitations upon individual commitments, a county-wide coordinating committee was formed. Two members from each township planning committee were selected to be members of the coordinating committee. The role of the committee was to provide input to the planner about the issues raised at

their local meetings and to interchange these ideas with the representatives from the other townships. Thus, there was a continual flow of information.



EXISTING CONDITIONS

## Existing Conditions

The purpose of this section of the Land Use Development Plan is to evaluate existing conditions within the county, specifically demographic and economic patterns.

### Population

It is significant to note that the population of the county has been declining since the turn of the century. This trend is not unique to only Hyde County but for a majority of rural counties and communities as well. The primary cause for this steady decline in population is due to the desire of young adults to relocate. As they complete their education, many have left the rural atmosphere seeking the amenities and life style of the city. The Hyde County experience is consistent with that phenomenon. It is noteworthy that during the decades of the 1940's, 1950's and 1960's, when most cities experienced their greatest growth, the county simultaneously witnessed its greatest population declines. The following table illustrates the population statistics for the county from 1900 through 1970.

TABLE I

## HYDE COUNTY POPULATION 1900-1970

<u>YEAR</u>	<u>POPULATION</u>	<u>NUMERICAL CHANGE</u>	<u>PERCENTAGE CHANGE</u>
1900	9,278	-	-
1910	8,840	-483	4.72
1920	8,386	-454	4.13
1930	8,550	+164	1.96
1940	7,860	-690	8.07
1950	6,579	-1,281	16.30
1960	5,765	-814	12.34
1970	5,571	-194	3.37

SOURCE: Census of the United States

The 1970 Census, however, reflects that there was a sharp decrease in the rate of population decline, from over twelve (12%) percent in 1960 to less than four (4%) percent in 1970. At the present time it is premature to speculate upon whether the population of the county will continue to decline, level off, or experience expansion. Much of the future is dependent upon economic decisions, land use decisions and philosophical values that affect personal decision making. Current studies indicate that the trend of out migration from rural areas of the United States may be reversing, with individuals and families from metropolitan areas beginning to relocate in rural areas. This appears to be a result of high crime rates, high property tax

rates, and generally unfulfilled personal expectations with life in the city.

The county's 1970 population distribution by townships is illustrated in the following table:

TABLE II

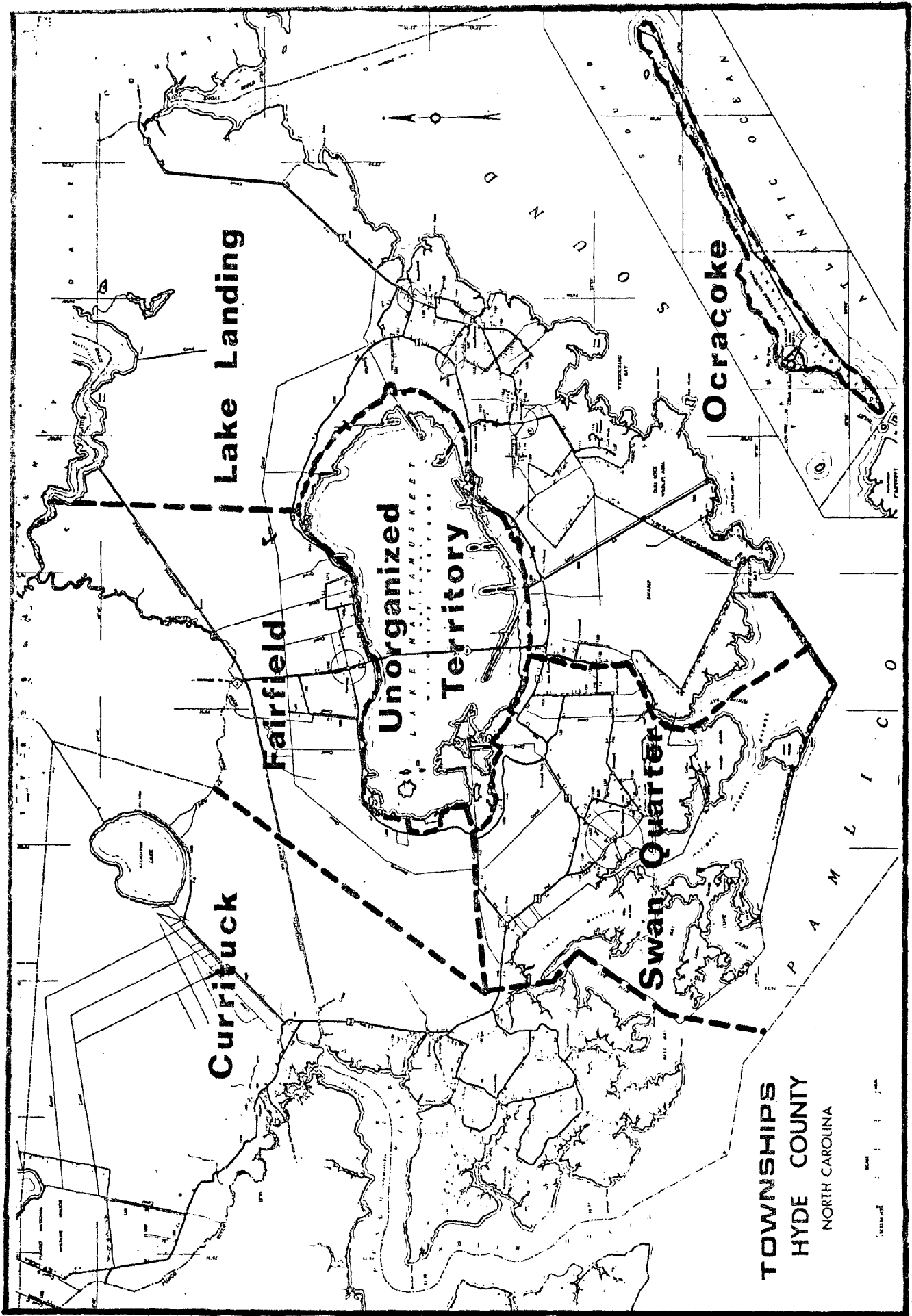
HYDE COUNTY 1970 POPULATION DISTRIBUTION  
Racial Composition

<u>Township</u>	<u>White</u>	<u>Black</u>	<u>Total</u>
Currituck	609	485	1,094
Fairfield	370	212	582
Lake Landing	1,093	1,264	2,357
Ocracoke	412	7	419
Swan Quarter	788	331	1,119
TOTALS	3,272	2,299	5,571

SOURCE: 1970 Census, 5th Count

Table II reflects that a majority of the population resides in three townships: Currituck, Swan Quarter and Lake Landing. Geographically, the dominant population distribution occurs in the southern portion of the mainland portion of the county. The racial composition of the county, also denoted on the above table, reflects that 58.7 percent of the county is white, while the remaining 42.3 percent is black.

The following table shows the population distribution by



MAP 2

township, according to age groups.

TABLE III

POPULATION BY TOWNSHIP AND AGE GROUP

<u>TOWNSHIP</u>	<u>0-16</u>	<u>17-21</u>	<u>22-44</u>	<u>45-59</u>	<u>60+</u>
Currituck	372	57	280	147	238
Fairfield	201	14	126	127	114
Lake Landing	928	231	501	326	371
Ocracoke	119	20	108	114	58
Swan Quarter	325	104	229	206	255
SUB TOTALS	1,945	426	1,244	920	1,036
PERCENTAGES	34.9	7.6	22.3	16.5	18.6

SOURCE: 1970 Census, 5th Count

The table shows that over fifty (50%) percent of the population is in age groups in which individuals may, to some degree, be dependent upon others for support. This support may be provided by either families or public agencies. Recently, the largest increases in the county's public assistance have occurred in the payments made in old age assistance and aid to families with dependent children. However, this should not be interpreted to mean that all individuals over the age of sixty or below age sixteen are receiving assistance; only that payments to these age groups have continually shown increases. The

significance of the preceeding fifty (50%) percent figure does imply that there are serious problems when the county must rely upon half of the population to produce its goods and services. Thus, as may be expected, the tax resources of local government decline while demands for services normally increase.

#### Seasonal Population

Hyde County, like other coastal counties of North Carolina, has additional population concerns regarding part-time, seasonal residents. This group is composed of two elements - tourists and migrant workers. Generally these individuals and families bring additional revenues to the county, although they at the same time place additional demands upon various governmental services.

The impact of the tourist industry in the county is predominantly associated with the Island of Ocracoke. The permanent population of the Village is 419; however, during the tourist season the daily population may exceed 1,300. This expanded population reflects the total utilization of all motel rooms, rental cottages and the National Park Service campgrounds. The implications of this increased summer population upon the demand for governmental services is obvious, especially in the areas of police protection, emergency medical service, sewage disposal and water supply. Police protection responsibilities are divided among three agencies: the Hyde County Sheriff's Department, the North Carolina Highway Patrol and the National Park Service.

The County Sheriff's Department generally employs two full-time deputy sheriffs on the island. The department, however, does not have a detention facility on the island; and should the need arise, prisoners must be transported to Hatteras Island. This is a cumbersome process encompassing a ferry ride, in turn resulting in a fifty (50%) percent reduction in county provided law enforcement capabilities.

In terms of health care requirements and needs, only one physician is a resident and practices in the county. Therefore, one of the island's deputy sheriffs also doubles as the emergency medical service coordinator. A medical center is located in Manteo; however, if hospitalization is required, the hospital utilized by the island residents is in Beaufort, N. C. Transportation to the center involves a ferry ride to Cedar Island, approximately 2½ hours in duration. Although, in cases of extreme emergency, the U.S. Coast Guard may provide air-medivac services. In the main, medical services on the island are primitive.

In addition to the aforementioned services, the county and especially the village experience a strain upon water supplies, sewage disposal and solid waste disposal. Currently, fresh water is supplied from two sources - rain water collection and individual wells. While the water is not polluted, it has an unpleasant taste, principally due to high concentrations of saline elements. Therefore, to alleviate the problems associated with water supply, peak demand and potential pollution, a central



water system is presently being designed.

Waste water disposal on the island is accomplished via individual septic systems. Soil characteristics indicate that large scale development or a proliferation of septic tanks could result in health hazards. The primary problem is that sandy soils do not adequately remove undesirable nutrients from waste water, due to rapid percolation; resulting in potential pollution of nearby waters which are presently sources of water supply.

Equally as difficult, is the removal and disposal of solid waste. Recent federal legislation has caused the closure of the local trash dump, resulting in the off-island disposal of waste. During the summer, the solid waste must be removed on a daily basis to both the Buxton and Manteo facilities.

On the mainland of the county, the seasonal population impact is not as significant and is generally confined to sports fishing enthusiasts during the summer, and hunters during the fall and winter season. Perhaps the only negative impacts arising from these two groups relate to the lack of adequate parking, which is a function of lot size requirements and parking standards which do not currently exist in the county. In addition to the sports enthusiasts, migrant workers also are a noticeable seasonal population. Generally, the migrant workers arrive in June and July and assist in the harvest of truck crops: cucumbers, cabbage, and sweet corn. Although the number of migrant workers varies from year to year, there are normally 300 to 400 workers in the county. Perhaps the greatest concern raised by the

arrival of the workers is the adequacy of housing. Group  
quarters are available in Fairfield.

## Economy

The economy of the county is dominated by three activities: agricultural production, commercial fishing and tourism, with most of the county's residents being associated with agriculture and fishing. The economic well-being of the county is obviously a reflection of the intensity of the above-mentioned activities as well as others. The measure of the economic status of the county residents may more specifically be evaluated by measuring the following economic factors: median family income, employment statistics and the distribution of goods and services.

The first measure, median family income, is defined as that level of income from which fifty (50%) percent of all the county's families are above and the other fifty (50%) percent are below. According to the 1970 census, the median family income level in Hyde County is \$4,478. This figure becomes more significant when compared to the median family income figures for the State of North Carolina.

TABLE IV

### MEDIAN FAMILY INCOME

Hyde County	\$4,478
North Carolina	\$7,774
United States	\$9,869

SOURCE: 1970 U.S. Census

The table illustrates that the county's median family income was below the state and national average. In addition, when compared to the other 100 counties in the state, Hyde ranks 99 exceeding only Tyrrell County in median family income.

Another useful measure of the county's overall economic status is the average family income. In 1970 the income figure was \$6,177, nearly \$1,700 above the median family income. The difference between the two figures points out that there are significant segments of the population making less than the average family income; and according to the 1970 Census, approximately 33.5 percent of all families in the county lived below the poverty level. Table V illustrates the distribution of families living above and below the poverty level.

TABLE V

FAMILIES BY POVERTY STATUS 1970

<u>TOWNSHIP</u>	<u>FAMILIES ABOVE POVERTY STATUS</u>		<u>FAMILIES BELOW POVERTY STATUS</u>	
	RECEIVING ASS'T	NOT REC.	RECEIVING ASS'T	NOT REC.
Currituck	4	137	12	112
Fairfield	0	101	14	52
Lake Landing	27	338	26	143
Ocracoke	8	90	0	13
Swan Quarter	4	189	34	59
COUNTY TOTALS	43	855	86	379

SOURCE: 1970 Census, 5th Count

As of 1970, two townships appear to have the greatest proportion of poverty level income families: Currituck and Lake Landing, having forty-six (46%) percent and thirty-one (31%) percent of the families below the poverty level respectively. From this information, it may be assumed that the demand for public assistance payments is high, although from the table many families appear not to be receiving assistance payments.

Another measure of the overall economic status of the county is the rate of employment. The following table reflects the status of the county's labor force:

TABLE VI  
COUNTY LABOR FORCE

<u>YEAR</u>	<u>TOTAL FORCE</u>	<u>EMPLOYED</u>	<u>UNEMPLOYED</u>	<u>UNEMPLOYMENT RATE</u>
1962	1,840	1,700	140	7.6
1972	1,710	1,540	170	9.9

The table reflects that two changes have occurred in the labor force from 1962 to 1972: the size of the labor force has been reduced and the rate of unemployment has increased. This may be a direct result of the county's population decrease, thus causing a decrease in the employment opportunities. In terms of the general welfare of the public and the allocation of resources, this experience may cause serious complications

for the county.

The preceeding data does not paint an encouraging picture of the county's economic status; however, there are many bright spots. The county-wide retail sales and farm income figures are encouraging examples. During the period from 1962 to 1972, total retail sales for the county increased approximately 136 percent, from \$2.57 million to \$6.09 million. A large proportion of this increase may be attributed to increased tourism within the county. This trend may reasonably be expected to not only continue but also increase in the future.

According to recent estimates from the county's Agricultural Extension Agent, agricultural receipts have increased. The 1974 production year yields from corn and soybeans were approximately \$13 million. This increase represents yields from farm price increases as well as a greater production effort. It may be assumed that agricultural production will continue to remain a primary income producer for county residents in the future.

EXISTING LAND USE

## Existing Land Use

Prior to the formulation of a land use plan for the county, a survey of existing conditions is required. The following section will identify and analyze the existing use of land for residential, agricultural, commercial, public purpose and recreational. Accompanying the identification of these trends are implications for future land uses in the county as well as a forecast of areas likely to experience changes in the future.

### Residential

The pattern of residential settlement in Hyde County is not unlike other rural North Carolina counties. Single-family detached dwelling units are the primary components of the housing stock. According to the 1970 Census there were 1,923 dwelling units in the county. The following table illustrates the distribution of housing units in Hyde County:

TABLE VII.

#### HYDE COUNTY HOUSING UNITS

<u>TOWNSHIP</u>	<u>COUNT OF ALL UNITS</u>	<u>OCCUPIED UNITS</u>	<u>VACANT UNITS</u>
Currituck	374	324	50
Fairfield	195	175	20
Lake Landing	764	616	140
Ocracoke	198	144	54
Swan Quarter	392	345	47
TOTALS	1,923	1,604	311

SOURCE: 1970 Census, 5th Count



Of the 1,923 dwelling units identified, 311 were determined to be vacant, and of the remaining 1,612 units a total of 153 were identified as mobile homes. A land use survey of existing conditions conducted in July, 1975, revealed that there were in excess of 285 mobile homes, an increase of 84 percent since 1970. This increase, no doubt, reflects recent economic conditions which make it difficult for individuals and families to purchase the "traditional" single family home.

The majority of dwelling units within the county are single family homes and, not including migratory labor housing units, only one multi-family or apartment complex exists in the county. That complex is located on U.S. 264 near the village of Swan Quarter and has been developed by the regional housing authority, financed partially by the federal government. The complex includes a total of thirty-five (35) units which are available to low and moderate income county residents.

The majority of residential units are located in rural areas of the county, principally along the frontage of primary and secondary roads of the county. There are, however, several points of residential concentration scattered throughout the county: Ponzor, Scranton, Sladesville, Fairfield, Swan Quarter and Engelhard. Of the preceeding, Swan Quarter and Engelhard are the most developed. None of the above developed areas have incorporated.

## Agriculture

Agricultural production is the principal source of income in Hyde County. Crop production includes corn, soybeans, wheat, cucumbers and other truck crops. Corn and soybean production are the dominant activities. According to the 1969 Census of Agriculture, Hyde County was the fifth largest producer of soybeans in the state, with over 28,000 acres under cultivation. The following table reflects some of the recent county-wide agricultural trends:

TABLE VIII

### AGRICULTURAL PRODUCTION 1960-1970

	<u>1960</u>	<u>1970</u>
Acres in Farms	80,000	103,719
Total Farm Income	2,422,000	6,062,000
Crop Production Income	2,039,000	4,495,000
Livestock Income	256,000	1,567,000

SOURCE: Census of Agriculture 1959, 1969

In addition to crop production increases, an increase in livestock production has also been experienced. Livestock production is centered in the northwestern quadrant of the county, where the higher elevations are most prevalent. The above table reflects that substantial income increases have accrued to the livestock producers. The County Agricultural Extension Agent's

office has indicated that this trend has continued and income from swine and cattle production exceeded the \$6,000,000 (six million dollar) figure in 1974. Thus, when combined with the crop production figure, the county realized income of approximately \$12,000,000 (twelve million dollars) for 1974, nearly doubling the 1970 figure.

A majority of this income is produced by family farms, although in terms of aggregate size, corporate or "super" farms located in the county tend to dominate many conversations about agricultural production. However, at the present time, the family farm is the major income producer and is likely to remain so for years to come. The three corporate ventures that exist in the county are First Colony Farms, American Cynamid and the Pamlico Partnership. In combination, these corporate ventures control approximately 120,000 acres or 30 percent of the county's total land area. However, only a small percentage of this acreage is under cultivation at this time.

Agricultural production in Hyde County is a complicated process, and highly dependent upon the climatic conditions. Briefly, the process for land preparation for cultivation requires that two activities occur: first, the land be cleared of trees; and second, a system of drainage canals be excavated. The trees are first cut and the timber sold for either pulp or hardwood products. The remaining fibrous materials are placed into windrows and burned. The complexity of the drainage system is dependent upon the elevation of the tract of land and the degree

to which ponding occurs subsequent to rains. The importance of the drainage system is not to be taken lightly; for without adequate drainage, crop production in Hyde County would not be possible. Generally, there are three types of drainage ditches required: the main canals leading to a stream or other body of water, the collector canals and the field ditches.

The man-made drainage system provides two functions: it lowers the existing water table making cultivation possible; and secondly, provides accelerated drainage subsequent to heavy rains. On the average, Hyde County receives approximately 55 inches of rain per year. However, in recent years up to 72 inches have been recorded. Not only does the average rainfall pose problems as well as benefits, but it may come in short periods of time causing flooding in the fields; and if not removed quickly, the rain causes serious damage especially to the valuable corn and soybean crops.

#### Commercial Activity

Comparison shopping opportunities in the county are limited with the principal commercial centers located in Swan Quarter, Ocracoke and Engelhard -the latter being the largest in the county. According to volume, Ocracoke may be the greatest revenue source due to the tourist trade. In addition to the major retail activity areas, a minor amount of sales and service activity exists throughout the remainder of the county. Most notably this activity occurs in Fairfield, the Scranton/Sladesville area and in Ponzer. Much of that activity is located along

primary transportation routes and at important crossroads. The better opportunities for comparison shopping are located in Belhaven, Washington and Greenville, North Carolina. Although the retail sales of the county are relatively low, the following table reflects that the county's sales have increased from 1960 through 1970.

TABLE IX

HYDE COUNTY RETAIL SALES

<u>YEAR</u>	<u>AGGREGATE AMOUNT</u>
1960-61	2,539,767
1965-66	3,621,101
1970-71	5,801,429
1971-72	6,091,580

As illustrated above, retail sales since 1960 have increased approximately 40 percent. - the greatest increase occurring in the areas of food, automotive related and general merchandise.

The adequacy of the county's retail sales activity is difficult to evaluate, adequacy being defined as providing a full range of comparison shopping opportunities. As previously mentioned, the largest commercial activity center in the county is located in Engelhard, providing a full range of shopping opportunities. However, it is not centrally located; thus, residents in western portions of the county travel to Belhaven and Washington, N. C. for purchases. A significant constraint upon the expansion of the existing commercial activity is the

low population density and the great distances involved in traveling from one side of the county to the other. Due to the existing low density of population, the impact of commercial activity upon adjacent land uses is not a detrimental factor, unless they are located in an area which is subject to flooding and/or they utilize an inadequate septic tank for the discharge of their waste water.

Land utilized for wholesale and industrial uses is quite limited. The development plans for the Pamlico Partnership, however, does propose an industrial park development having access to the Alligator River. Presently, the largest industrial type activity is located in Lake Landing Township and is the chip mill operated by the Pamlico Corporation. The mill utilizes barges as the principal mode of transporting their product from the county to Norfolk, Virginia, using the Intra-Coastal Waterway. The impact upon the county is limited. Also located in Engelhard is the county's largest grain wholesale operation.

Commercial fish companies located in Engelhard, Swan Quarter and Rose Bay are the county's major source of commercial fishing activity. Primarily supplying shrimp, crabs and oysters these activities are some of the oldest commercial operations in the county, contributing approximately 2 million dollars of revenue to the Hyde County economy. Located along the northside of the Pamlico Sound, these companies have established the county as a center for the commercial fishing industry.

As in the past, the present level of industrial development in the county is not great. This is probably due to several factors: no railroad access, high water table and inadequate sewage disposal facilities for intensive industrial development.

### Recreation

Recreational opportunities in Hyde County are provided by both the public (governmental) and private sectors. A wealth of outdoor recreational opportunities exists in the county due to its water resources, wildlife, scenic areas, campgrounds and vacation sites.

The water resources of the county include both salt and fresh water. For commercial and sports fishing, the Pamlico Sound and the Atlantic Ocean are directly available from the county, from either the mainland or Ocracoke Island. New Lake, Swan Lake, Lake Mattamuskeet, Alligator River and the Pungo River all provide fresh water recreational opportunities.

Hunting may be one of the largest recreation-oriented income producers in the county, with the exception of the Ocracoke Tourist Industry. Contributing to the abundance of wildlife, several animal refuges are located in the county.

Gull Rock Wildlife Area - State of North Carolina

Mattamuskeet National Wildlife Refuge - Federal

Swan Quarter National Wildlife Refuge - Federal

Pungo National Wildlife Refuge - Federal

In addition to the managed hunting on the wildlife areas, the North Carolina Wildlife Commission maintains public hunting

rights on private land under the North Carolina Gamelands Program. Hunting as an active recreational resource is very important to the economy of the county. The passive recreational activities associated with bird watching are also valuable economic resources of the county. Many sightseers annually stop to watch the various migratory birds which stop at Lake Mattamuskeet for the winter.

The recently published study Wildlife and Land Use Planning With Particular Reference to Coastal Counties relates that relatively high deer and black bear populations are present in the county. It is estimated that over 65,000 man days of recreational pursuit are derived from the deer and black bear hunting season. Hyde County is recognized as one of the finest hunting areas in the eastern United States for duck and geese with over 42,000 man days of pursuit provided. Due to a change in the wintering grounds of the geese, their population in the county has declined from a high 100,000 to 25,000 birds. Ducks, on the other hand, have increased slightly to approximately 135,000 birds.

Private recreational facilities are limited to the Ponzor area and Ocracoke Island. The Riverside Campgrounds in Ponzor is the only private recreational campground on the mainland providing swimming, boating and a game room for its patrons. Likewise, Ocracoke Island provides camping and fishing opportunities with the camping facilities provided by the Cape Hatteras National Seashore. The planned initiation of ferry service from



Swan Quarter to Ocracoke will doubtlessly increase Ocracoke's importance as a recreational resource.

### Forestry

Forestry and related activities have a great potential in the county. Of the county's 392,320 acres of land, excluding Ocracoke, approximately 245,000 acres are classified as woodlands and a large percentage of this area could be harvested for commercial purposes. The following table reflects the ownership of the commercial forest land in Hyde County:

TABLE X

HYDE COUNTY COMMERCIAL FOREST LAND  
BY OWNERSHIP AND PERCENTAGE OF TOTAL AREA

Federal Ownership	14,256	5%
State	12,850	5%
Forest Industry	39,635	16%
Farmer	46,468	19%
Corporate	82,613	33%
Individual	49,042	21%
<hr/>		
TOTAL AREA	244,864	100%

The previous table reflects that the commercial forest industry owns approximately 16 percent of the total woodlands within the county; a majority of this acreage is located within Currituck Township and is subject to selective harvesting and replanting. By and large, however, a majority of the county's

woodland, if harvested, would not be replanted for commercial purposes and likely would be converted to agricultural land. For example, corporate ownership of woodlands located in Lake Landing Township approaches 83,000 acres and is projected to be developed for agricultural production. Therefore, the normal process allows for harvesting only once, then the use is converted. The table also identifies that approximately 40 percent of the commercial woodland is owned by individuals and farmers; therefore, much of the forestry potential in the county is dependent upon individual decision making.

The forest industry's 39,000 acres are primarily located in the Scranton/Sladesville area, on the southside of U.S. 264 extending to the Pungo River. These lands are both selectively cut and clear cut depending upon the species. The primary species of timber found in Hyde County are the Pond Pine variety, on approximately 172,000 acres and the Oak-Gum and Cypress totalling approximately 54,000 acres. Like many coastal counties, the soft wood stands in Hyde County are the dominate form of woodland growth. In terms of productivity, the majority of the county's forested areas are classified as capable of producing less than 85 cubic feet per acre annually with over 120,000 being incapable of producing 50 cubic feet per acre annually. For commercial purposes, the woodlands of the county are not economically the prime areas for harvesting and reseedling practices. Therefore, one may assume that forestry activities may become more closely associated with land clearing practices rather than attempting to produce high yield forests for commercial activity.

EXISTING LAND USE COMPATIBILITY PROBLEMS

Significant Land Use Compatibility Problems, and Major Problems Which Have Resulted from Unplanned Development and Which Have Implications for Future Land Use.

The existing land use map denotes that, at the present time, there are few land use compatibility problems. Normally in the "traditional" urban planning process, compatibility problems are identified as those where two or more land use types are adjacent to each other and one is restrained from expansion due to adverse conditions, thus new investment is discouraged. More specifically a land use compatibility problem may exist when industrial development intrudes into residential areas, or the flight pattern of air traffic into and out of an airport is over residential areas or other congested areas. For the purposes of evaluation, with respect to Hyde County, these compatibility considerations may be divided into physical and environmental categories.

Physical Conditions

The land use map reflects that physical development in the county is relatively limited and has not advanced to a state which causes serious compatibility problems. One area, the Village of Ocracoke, however, does exhibit characteristics of physical compatibility problems. The village is located at the southern end of Ocracoke Island occupying approximately 775 acres of the island's land mass. The remaining acreage is under the jurisdiction of the U.S. National Park Service. The physical compatibility problems present in the village are due to mixed residential and commercial land uses, compounded by inadequate

off-street parking resulting in vehicular and pedestrian circulation problems.

Future development in the village will almost certainly occur; therefore, action to provide for adequate physical compatibility is required. The nature of this action is to provide for the separation of land use types thus maintaining the current atmosphere of the village as well as property values.

#### Environmental Conditions

On the other hand, there are also environmental considerations and implications resulting from current development that one cannot ascertain from the land use map. The environmental considerations are two-fold; first, having to do with wastewater disposal; and second, relating to drainage. Wastewater disposal is a county-wide consideration and no doubt is, or shortly will become, a major constraint upon future development. At the present time, the more developed areas like Swan Quarter, Engelhard, Ocracoke, to name a few, are most affected by sewage disposal problems. Since a municipal sewage system does not exist, wastewater disposal is accomplished through the utilization of on-lot disposal techniques. The ability of these individual systems to perform properly is dependent upon several factors, including soil conditions, water table levels, and the proximity to other units. The developed areas of the county do not have the best soil conditions for septic systems although they may work adequately on the mainland if they are given proper drainage fields. The crowding of commercial or residential activities

together on small lots tends to cause wastewater pollution problems. This is especially true on Ocracoke where the sandy soils do not remove toxic wastes from the water and transfers the waste directly into adjacent waters.

An important consideration for the future of the county will be sewage disposal. Should development occur to any degree, the environmental considerations of lot size, area needed for on-lot disposal or the desirability of a central system will have to be evaluated.

In addition to wastewater disposal, agricultural drainage is an environmental consideration of growing importance. Briefly, the question revolves around the need for agricultural drainage ditches and at the same time the need to maintain the integrity of the estuarine waters for shell and fin fish. Unfortunately, all the data is not in on many of the basic questions concerning this issue. It may be reasonably assumed that the issue will intensify in the future. It must be noted that the central issue is not one of either or, but rather both. Again, this is dependent upon adequate collection and evaluation of data and perhaps the development of new techniques. For a complete discussion of this topic, refer to the section titled "Areas with Resource Potential".

### Areas Experiencing or Likely to Experience Major Land Use Changes

At the present time, there are two areas of the county experiencing land use changes, while one or two other areas have the potential to change in the future. The existing land use map denotes that the two major areas are undergoing a change and are colored brown located in the northern section of Lake Landing and Currituck Townships. These changes are totally associated with the large corporate farms and, more particularly, are reflections of their current land clearing activities. The basic change is from woodland to agricultural land. The implications for the future are, therefore, associated with agricultural production and drainage.

In addition to those very obvious land use changes, the only other major changes that may be anticipated are associated with the new Ocracoke-Swan Quarter ferry. Those changes will probably have a more noticeable impact upon Swan Quarter than Ocracoke.

**CURRENT PLANS, POLICIES AND REGULATIONS**



## Current Plans, Policies and Regulations

This element of the county's land use plan is an identification of current plans, policies and regulations which will have an impact upon present and future land uses. Specifically, this includes transportation plans, community facility plans, utility extension policies and other regulations. These items are significant in terms of what they will or will not affect. For example, if the county has a policy that it will provide central sewage collection to every home in the county, growth is encouraged everywhere and at a very high cost to the county and perhaps to adjacent land owners as well. The decisions made by elected officials may either assist or hinder the future of the county.

### Water Facility Plans

In 1968, the Hyde County Comprehensive Water and Sewer Study was completed. That study proposed that consideration be given to the development of public water supply systems for the existing population centers throughout the county: Swan Quarter, Engelhard, Fairfield, Scranton, Sladesville and New Holland. The study further recommended that as the population growth increased along U.S. 264, consideration be given to the construction of a county-wide water system. The study also recommended that a detailed study be completed for the Village of Ocracoke.

Subsequent to the publication of the study and the increasing demand for fresh water, two water associations were

formed and central supply systems constructed in Swan Quarter and Engelhard. Later the water supply was extended to New Holland and later central water supplies were available to those residents of the county who lived between Swan Quarter and Engelhard.

Recently, 1975, the County Commissioners purchased the two independent systems from their respective water associates for the purpose of establishing a county-wide water system. The county-wide system will combine the existing Engelhard and Swan Quarter systems into a configuration that will ultimately provide central water supply capabilities to the residents of Fairfield, Rose Bay and Scranton. Future extensions are also proposed for the Sladesville and Ponzer communities. Initiation of the first phase of construction occurred in late 1975.

The focal point of this new system is the Fairfield community where a well field, treatment facility and 100,000 gallon elevated water tower are to be located. The new system will connect into the Engelhard complex at the intersection of S.R. 1311 with S.R. 1315 following S.R. 1311 along the north side of Lake Mattamuskeet to the Fairfield community. From the west side of Fairfield the main transmission line will follow S.R. 1305 to the intersection of 1304, heading west to Rose Bay intercepting a line from Swan Quarter at the S.R. 1304, U.S. 264 intersection. One line will then follow

HYDE COUNTY  
WATER SERVICE AREAS

LEGEND:



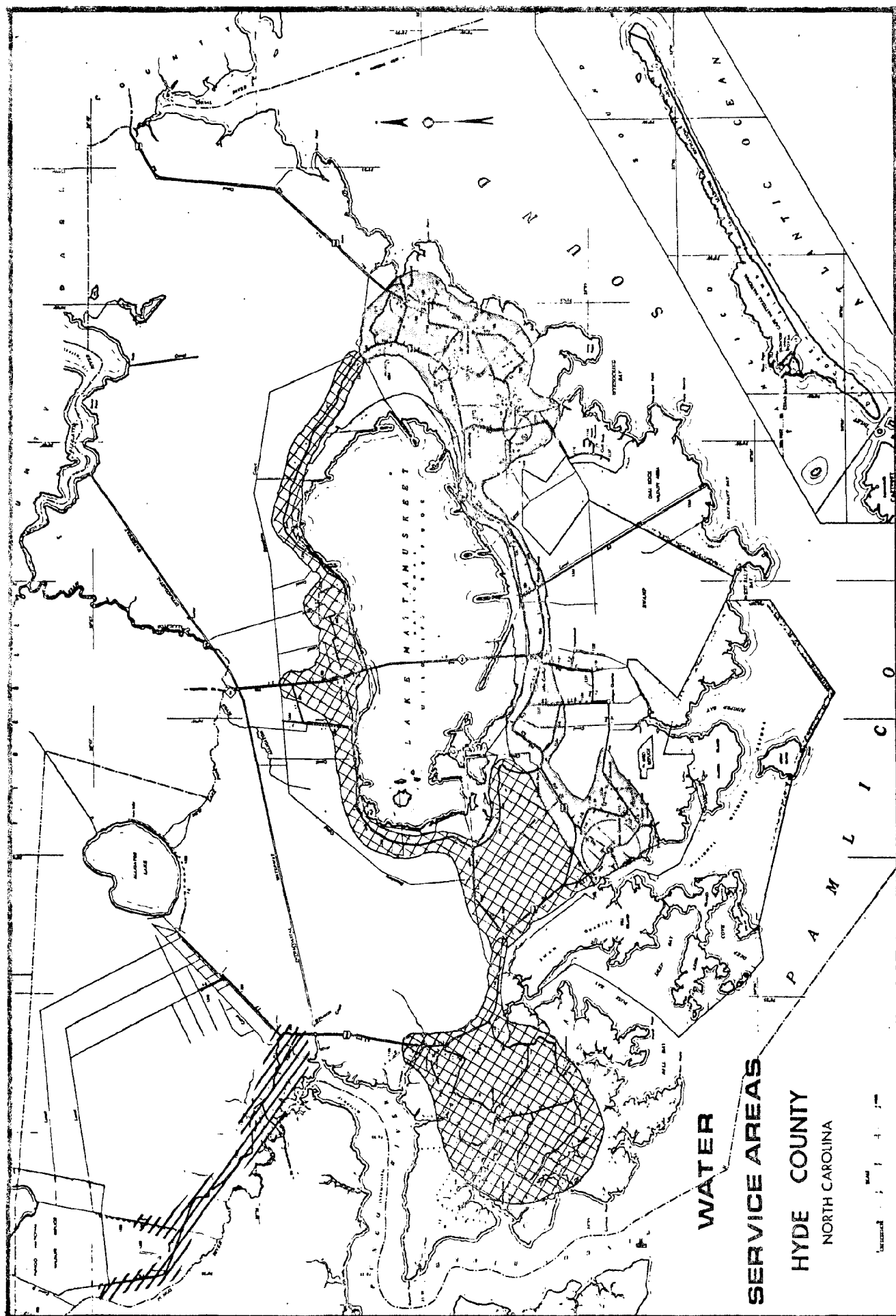
EXISTING SYSTEM SERVICE AREA



EXTENSION SYSTEM SERVICE AREA



FUTURE SYSTEM SERVICE AREA



MAP 3

U.S. 264 to Scranton service area. The completion of this phase of the water system will provide central water service to approximately 600+ potential consumers.

Construction plans for a central water supply system for the Village of Ocracoke have also been completed. This portion of the county water supply system is to be operated by an independent water association. The Ocracoke system will provide service to the residents and business ventures of the village as well as to the U.S. Coast Guard Station and the National Park Service. The system will be composed of two deep wells, a desalination facility and two storage tanks with a combined capacity of 500,000 gallons. This facility will provide a four-day supply of water, based upon estimated peak usage demands. Current estimates call for approximately 100,000 gallons per day capacity required during the summer months, declining to 25,000 gallons per day during the winter.

The proposed construction of these two systems has significant implications for county land use trends. The provision of central water supply and service is obviously one technique which a community may utilize to stimulate growth. The provision of basic services such as sewer and water have the tendency to increase development of both commercial and residential sectors of the economy. With improved access to central water, development may increase; however, solutions to adequate sewage disposal will have to be discovered as well, and until then, development may be restrained. The provision of central water services

to county residents is no doubt a blessing, especially in light of the 1968 study which pointed out that approximately fifty (50%) percent of the families did not have safe or approved water supplies.

The county has employed a water system manager for the mainland portion of the county and the Ocracoke system will be managed by the Ocracoke Sanitary District. Perhaps the most important aspect of the system other than the basic supplying of water are the policies regarding the provision or extension of service. There are two fundamental responsibilities of the county, first the county may install its meter at the property line or, at the county's option on the customer's property at a location mutually agreed upon. Secondly, the county reserves the right to refuse service unless the consumer's lines or piping are installed in such a manner to prevent cross-connection and back flow from a private well. In order for a person to gain access to the water system, an application form must be completed and a deposit placed on account with the water service manager.

The expansion of the existing system has been initiated. During this period, all property owners adjacent to the water line may request that a water meter be installed. During the construction phase, the contractor will bear the cost of installation; however, upon completion of the system a substantial tap-on fee will be required of individuals requesting new or additional meters.

The provision of central water may have an impact upon the present land use pattern. The degree of that impact is difficult to ascertain due to the overriding developmental consideration of sewage disposal. It may be anticipated that increased development may occur in the areas provided with central water and that this growth would most likely continue to occur along the road frontage. Thus, a continuation of the existing development pattern will no doubt continue, until sewage disposal techniques are developed which permit higher density development to occur.

#### Transportation Plans

Another great impact upon the future of the county will be the initiation of ferry service between Swan Quarter and Ocracoke. Although discussions regarding this proposal have been occurring for more than ten years, the State General Assembly in 1975 appropriated funds for the construction of a ferry and docking facility. The construction of the ferry and docking facility has been started and initiation of service is anticipated in 1977. The completion of the ferry will, for the first time, provide direct access from Ocracoke to the mainland portion of the county.

As proposed by the North Carolina Department of Transportation, the docking site will occupy a 50-acre area approximately seven-tenths (7/10) of a mile southeast of Swan Quarter on S.R. 1128. The existing docking site on Ocracoke now utilized for the Cedar Island Ferry is also to be used for the Swan Quarter Ferry. The major transportation improvements are

primarily associated with the mainland docking site, and improvements to S.R. 1128, between the terminal and Swan Quarter proper.

The implications for the county may be substantial and are associated with two phases: construction of the facilities and the actual operation of the ferry. The construction phase effects are short run in nature and may be associated with expanded employment opportunities. These may occur in both the public and private sectors, but, as noted, are only short term in nature.

The operational implications of the ferry, no doubt, have the greatest potential to affect not only the land use pattern but also the social and financial status of the county residents. One of these significant impacts will be the direct access to the mainland for the residents of Ocracoke. Previously, it was a five or six hour one-way trip to the county seat for residents of the island. Obviously, this has been an unfortunate hardship upon the island's residents.

Upon the initiation of service, the ferry will increase tourism in the county. It is from the increase in tourism that changes in the land use pattern will result. The changes, initially, may be expected to promote new commercial activity. The county, at the present time, does not have a drug store, motel or fast food establishments. The ferry will also place Hyde County on the "tourist map" and pressures for development may be strongest in the Swan Quarter area. Again, the greatest



constraint upon development will continue to be sewage and waste water disposal. Immediate, explosive growth will probably not result allowing the county to adequately direct future growth. The additional growth that does occur will affect employment and wages in the Swan Quarter area which may, in turn, affect new housing starts or an increase in mobile homes, assuming no sewage problems.

The only other transportation facility which is being currently planned is an air facility on the north side of U.S. 264, northeast of Engelhard. Upon completion, this will become the only paved landing strip on the mainland.

#### Recreation Policies

The county's recreation is divided into active and passive or non-intensive opportunities. The active recreational programs are funded by the county and expended by the county's Recreation Committee. In general, the major emphasis of the committee's focus is during summer vacation period. The committee develops and organizes programs which run during the week from morning until sunset. The county does not have a set of written policies regarding recreation, although it is the committee's goal to provide equal recreational opportunities to all residents of the county.

#### Open Space Policies

The county does not have any written policies regarding the provision or acquisition of open space.

#### Prior Land Use Plans

The county does not have a previous land use plan.

#### Prior Land Use Policies

The county has not had any written land use policies.

#### Local Regulations

##### Zoning Ordinance

The county does not have a zoning ordinance.

##### Subdivision Regulations

The county does not have Subdivision Regulations.

##### Floodway Ordinances

The county does not have any regulations on floodways. However, the county does qualify for the emergency phase of the National Flood Insurance Program sponsored by the U.S. Department of Housing and Urban Development.

##### Building Codes

The county, as a prerequisite to become qualified for the emergency phase of the National Flood Insurance Program, adopted the State of North Carolina Building Code.

##### Septic Tank Regulations

The county has adopted and through the sanitarian enforces the State of North Carolina Septic Tank Regulations.

Historic Districts Regulations

The county has adopted no Historic District Regulations.

Nuisance Regulations

The county has not adopted any Nuisance Regulations which relate to land use.

Dune Protection Ordinances

The county has not adopted any Dune Protection Ordinances.

Sedimentation Codes

The county has not adopted their own sedimentation code.

Environmental Impact Statement Ordinances

The county has not adopted any Environmental Impact Statement Ordinances.

LAND USE ISSUES AND  
PUBLIC PARTICIPATION

## Principal Land Use Issues

This segment of the county land use plan is a discussion of the major land use issues which face the county, the development of local objectives, policies and standards as well as a discussion of the public participation activities associated with the development of this document.

### Major Land Use Issues

There are basically five components to this evaluation:

- 1) the population and economic trends; 2) the provision of adequate housing and other services; 3) the conservation of productive natural resources; 4) the protection of important natural environments; and 5) the protection of cultural and historic resources.

### Future Population and Economic Trends

The future population of the county, according to those who participated in the planning process, would ideally be somewhat larger than the current population. The residents of the county desire a moderate increase in the total population to a total of approximately 7,000 to 8,500 people. However, they emphasize that they do not desire to become known as "city folks" but would rather gain additional population in a manner which would not essentially change the current atmosphere and character of the county. In general, the modest increases desired should be centered in areas which have experienced development, thus

reserving the vast majority of the acreage for agricultural purposes. The ideal form of this growth would be natural, in other words, reducing the incidence of net out-migration from the county. Obviously, there are circumstances which may occur resulting in a potential influx of new residents; however, the over-all goal is not to encourage rapid and uncontrolled growth.

The dominant economic trend in the county is agriculture, with commercial fishing and tourism following at a distance. The citizens of the county feel strongly that the basis of the local economy should continue to be agricultural production and related economic activities. It may be safely stated that the residents do not desire the location of any "heavy" industries within the county, such as massive factories which dominate the landscape of large industrial areas. However, the county would no doubt welcome some form of small manufacturing operation which does not pollute the water and air resources, but does capitalize upon the available work force in the county.

The desires of the residents concerning the commercial fishing industry are that the activity not only continue, but expand where possible. The process of expansion is probably in two areas: increased catches, including adequate fishing waters; and secondly, an increase in the processing of fish products.

The tourist industry trends in the future will most certainly increase, not only on Ocracoke but also on the mainland. Due to a limited experience with summer tourism on the mainland, which has previously been associated with sports fishing enthusiasts, there have been few feelings expressed concerning tourism.

The tourist experience by Ocracoke residents has been much longer and is the principle source of their income. The desires of Ocracoke residents is that adequate facilities be established to handle large summer population increases which the island annually experiences

#### Provision of Adequate Housing and Services

The residents of the county have expressed several concerns regarding the future of housing and other services. The major concern revolves about the type of housing that the county would prefer to have constructed. It is generally held that single family detached housing would be the most advantageous type of construction to have, as opposed to multi-family, apartment building units. In addition, many feel that there has been a significant increase in the location of mobile homes throughout the county, and while not opposed to that type of housing, high concentrations or inadequate facilities for mobile homes may cause serious problems in the future.

In addition to the provision of new housing, the county will also face the prospect of rehabilitating existing units, bringing them up to minimum standards. Recent figures reflect that many dwelling units in the county are substandard by reason of long term vacancy which has led to a total state of disrepair or other causes such as inadequate plumbing. A total of 633 units in the county lack some or all plumbing, according to the 1970 census. Of the 633 units, 460 were occupied, or approximately 28.5 percent of the county's 1,612 occupied dwelling units.

A significant housing problem and service consideration concerns the elderly. The elderly have represented one of the major population segments within the county and many feel that their needs are inadequately met. The residents would prefer not to have to send their elderly family members to facilities outside the county in order that they receive adequate health care, housing and other needed services. At the same time, the residents would like to see additional programs established which are oriented toward the elderly and their needs

Perhaps one of the major concerns which the residents of Hyde County have been attempting to find adequate solutions for is sewage disposal. In light of recent federal legislation, greater state involvement and future development in the county, sewage disposal becomes a key issue. The residents of the county recognize that central sewage disposal on a county-wide basis is not only uneconomical but not warranted. The issue, residents feel, must be approached from two standpoints - the recognition that future "development" areas are going to require a central sewage disposal system and that new, adequate on-lot disposal techniques must also be developed. The reasons for these needed techniques are obvious and greatly impact upon the preservation of the productive natural resources.

#### Conservation of Natural Resources

The two most important natural resources in Hyde County are the highly productive agricultural resources and the commercial fishing waters. Agricultural production, as previously noted,



is and has been the base for the county's economy. The expansion of agricultural production is highly desired and, to a significant degree, is dependent upon the provision of adequate drainage. This includes the initiation of new farm drainage canals as well as the maintenance of the existing drainage canal system. The residents of the county are most vocal about and dedicated to the need for drainage. There are a few individuals who feel that drainage from farm land is automatically harmful to the biological functions of the estuarine waters. However, in general, this is not true. The drainage canals in many cases provide spawning areas for marine life, at the same time, providing avenues by which nutrients from marshlands may flow to the estuarine waters. The issue is not one sided however, and fortunately, all the data required to make a final decision has not been collected and evaluated by the scientific community.

Perhaps more importantly, the issue of agricultural production versus the complete protection of the state's estuarine waters has not been addressed in terms of priorities. For example, the world is faced with severe shortages of food, grains and other edible commodities, and the United States is faced with a loss of productive estuarine waters. A source of this loss may be agricultural production, but in terms of the world-wide issues there would appear to be an overriding public interest in gaining maximum possible production. The residents of the county do not take the position that agricultural production should be allowed to indiscriminantly pollute the estuarine system if, in fact, this

is true. But rather, the attitude is one of protecting both resources to the extent that they are productive and economically profitable. In other words, the complete protection of one resource without consideration for the validity of the other is inappropriate. The county residents feel that a balanced approach is necessary.

The maintenance of the estuarine system for viable commercial and sports fishing is an important issue in the county, as noted above. The extent of shell fish and fin fish resources within the Pamlico Sound and waters adjacent to the county has fluctuated. These fluctuations have been results of pollution of the waters, changes in the salinity and other factors. In general, however, the sports fishing industry has enjoyed increasingly more participation each year. At the same time, the commercial fishing industry, especially the county's important shrimp and oyster businesses, have enjoyed equally good years as well. This is not to imply that they could not have been better.

Those residents of the county participating in the land use planning process believed that the protection of these productive natural resources is indeed an important issue of the future. Their concern is not that there will be too little protection, rather that the protective measures may preclude the use of one resource in favor of another.

HYDE COUNTY  
PRIME FISHING WATERS

LEGEND:



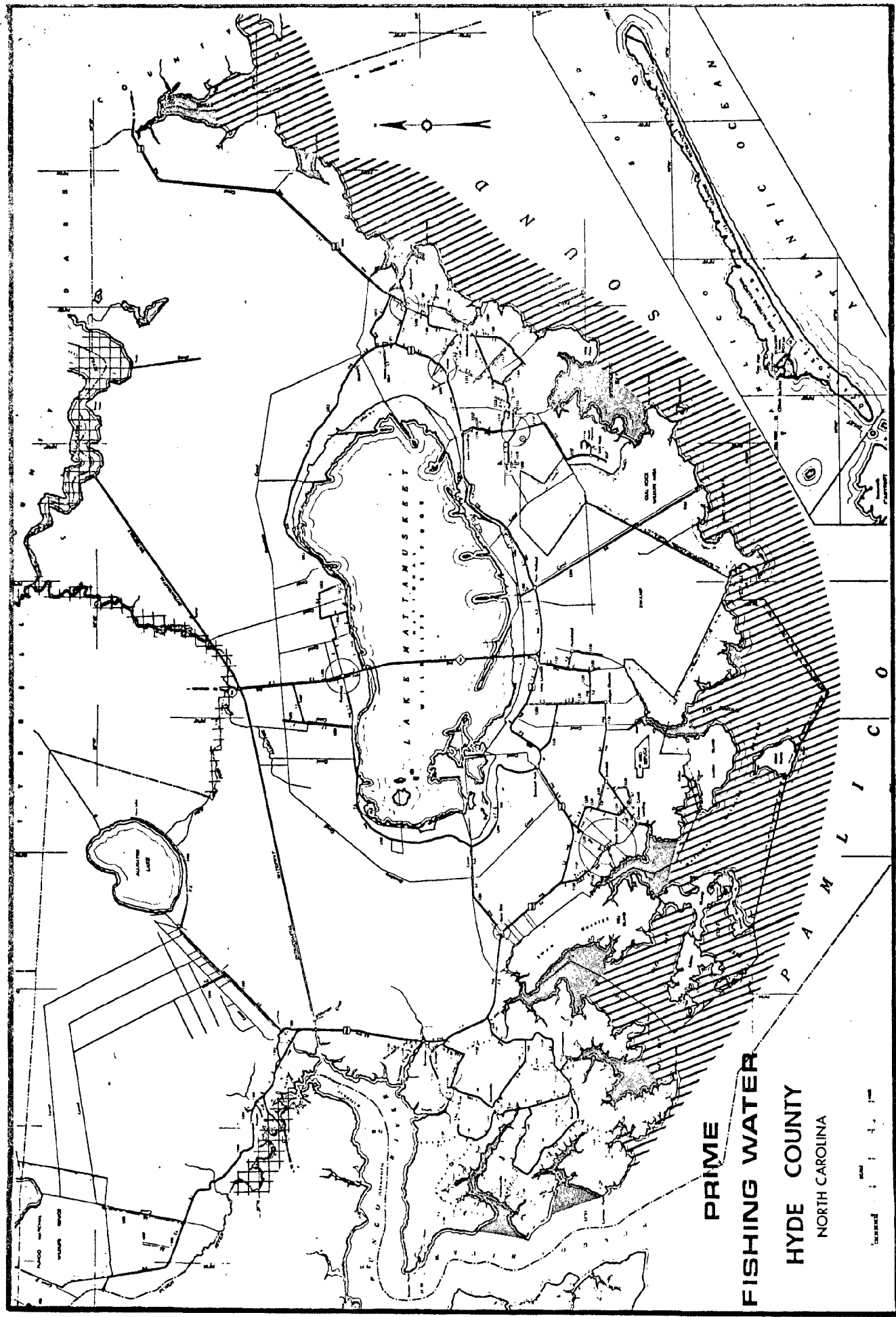
SHRIMP, CRAB, & FISH NURSERY AREAS



STATE OYSTER MANAGEMENT AREAS AND NATURAL POPULATIONS  
OF OYSTER, CLAM, & SCALLOPS



PRIMARY ANADROMOUS FISH SPAWNING AREAS



MAP 4

### Protection of Natural Environments

The protection of natural environments has been defined by the county's land use planning committee to be primarily associated with wildlife habitat, unique geological areas and natural areas. The issue was not believed to be a pressing one for Hyde County due to the extent of federal and state land holdings in the county. These holdings are primarily oriented toward the protection of wildlife habitat and exceed 100,000 acres within the county. Therefore, the residents felt that adequate protection of wildlife habitat and natural areas was sufficient.

### Protection of Cultural and Historical Resources

The residents of the county who participated in the land use planning process recognized that there were certain places of local cultural and historical importance. However, without an exact enumeration or complete documentation, it would be impractical to attempt to protect these places. Therefore, an accounting of these places and resources was recommended. Then steps could be taken for their protection.

### Alternatives Evaluated Prior to Objectives, Policies and Standards Formulation

The alternatives that were evaluated prior to the formulation of the county's objectives, policies and standards were centralized upon two fundamentals: first, the expansion of agricultural production and the associated need for adequate drainage; and secondly, the recognition that the commercial fishing industry is an important economic factor within the

county. Thus, many of the land use objectives are oriented toward the expansion of these two industries, at the same time recognizing the potential and growing importance of tourism.

The land use committee also felt that the objectives and policies should attempt to be as specific as possible, thus phases such as "a decent house for every county resident" do not appear. The philosophy utilized in the county was that the adopted policies and objectives should be generally programs which could reasonably be undertaken by the county government for the benefit of all residents and visitors to the county. By remaining fairly specific, it was felt that the policies could be measured in terms of accomplishments and as an indication of the effectiveness of the county's governmental processes.

#### Land Use Objectives Policies and Standards

Policy: Maintain agricultural production within Hyde County

1. Provide for the maintenance of all existing drainage rights-of way.
2. Promote the development of a county-wide drainage plan which would detail:
  - a. All drainage water courses, man-made and natural, which are essential for agricultural and forestry production.
  - b. The establishment of a spoil area for a minimum distance equal to sixteen (16) feet, not to exceed an area equal to twice the average width of the existing water course for spoil disposal.
  - c. The spoil area be designed in a manner which would not cause ponding of water behind the spoil bank thus blocking the flow of nutrients into the estuarine system.

- d. That new or expanded drainage rights-of-way be required to obtain and comply with State and Federal permits and requirements.
3. To encourage the preservation of agricultural land by directing housing and commercial development to occur in population centers, especially those with central water service.

Policy: Maintain and improve the quality of housing within the county.

1. Promote the development of single-family detached housing units rather than multi-family units.
2. Mobile homes which desire to locate within the county be required to meet the minimum FHA requirements concerning lot area size and health requirements.
3. A zoning plan be developed and initiated to protect agricultural, residential and commercial developments which currently exist, thus providing orderly and timely growth.
4. That group housing quarters for migratory workers meet the minimum health standards, and not become a detriment to the county.
5. The county investigate the feasibility of constructing a residential home for the elderly.

Policy: Hyde County encourage the location of small industrial-related industries that are environmentally sound.

1. Encourage industrial development which would provide employment for the currently unemployed.
2. Encourage industrial development which can be related to the existing economic base: agriculture, forestry and commercial fishing.

Policy: Provide, preserve and enhance the educational, recreational activities and opportunities throughout the county.

1. Encourage the county government to develop and expand recreational activities by delegating more responsibility and financial assistance to the County Activities Board.

2. Encourage the development of tourist rest areas and roadside tables along major transportation routes of the county, initially investigating the intersection of N. C. 94 and U. S. 264.
3. Inventory, preserve and restore the buildings, places, and objects which remind us of our place in history.
4. Initiate discussions with the management of the Mattamuskeet National Wildlife Refuge to provide improved opportunities for bird watching; by connecting and maintaining existing roads and by providing adequate off-street parking at prime vantage points along the northside of the lake.
5. That the county investigate the feasibility development of a technical education program in the county or provide financial assistance in the form of loans to individuals who are in need of such assistance.
6. That all routes utilized by the county school bus be paved.
7. That school buses be provided with adequate off-street parking.

Policy: That governmental activities become even more efficient and responsive to citizens' needs.

1. A county-wide citizens' advisory board be established to improve citizen participation in county decision making.
2. That deputies of the County Sheriff's Department be trained in providing first aid in case of emergencies.
3. That a study be initiated to evaluate the need and feasibility of constructing a central sewage system for areas of the county with high concentrations of population and commercial activity.
4. Steps be taken to control dogs, at a minimum requiring a dog tag and rabies shot tag on every dog.
5. That the county periodically disinfect the solid waste disposal containers, reducing the nuisance of rodents and insects.
6. That a mosquito control program be initiated.



Policy: To provide adequate health care and other facilities and programs for all residents of the county.

1. That the county investigate the development of a county medical center capable of providing and administering emergency medical services.
2. That the county encourage the creation of an emergency service associated with the existing volunteer fire departments.
3. That a study be initiated regarding the need for a residential home for the elderly.
4. That a detention facility be constructed on the Island of Ocracoke to improve police protection.
5. That the county continue to press for improvements of N. C. 12 on Ocracoke Island.
6. That the county investigate the joint purchase of a helicopter with the four adjacent counties for emergency medical education.

### Public Participation Activities

The Hyde County public participation experience may be best viewed as one of joint responsibilities among three various groups: the general population, elected officials and the planner. The goal of the public participation element encompassed two principle components and an evaluation of the process should be viewed with them in mind. The first aspect of the process was to relate the implications and requirements of the Coastal Area Management Act to as many county residents as possible; and secondly, to solicit from the population their desires regarding future development, population expansion and future land use patterns.

The participation of the elected officials has been gratifying. Their first decision was that the county, in fact, desired to produce their own land use plan, rather than have the state do it for them. The Board of Commissioners, thus, initiated the process by appointing a county-wide land use committee composed of citizens from every township within the county. This occurred prior to a planner being assigned to the county. Since that time, the Board has publicly supported the planning activities and have encouraged residents of the county to participate in local meetings. In addition, the Board has provided valuable insight into what the implications of some local land use decisions have been and, in fact, will be in the future.

The appointed land use committee became the focal point for

the planning process. At the first meeting with the planner, the committee stated that it would be most advantageous if the group was divided into township committees, which would provide the impetus at the local level for the planning process. The township committees were thus formed and the first phase of the public participation element was initiated - public education. Through a series of township, civic club and single-purpose club meetings, the educational process was accomplished. A number of meetings were scheduled by the members of the land use committee to provide each citizen with the opportunity to learn about and ask questions about the Coastal Area Management Act. Most of these same groups were also approached to provide input into the planning process, especially in the design and development of the standards and policy statements of the plan.

The township committees also were given the responsibility of developing local standard and policy statements which would be later incorporated into county-wide statements. Thus, local residents not only have had the opportunity to attend public and civic club meetings, but have also had the opportunity to meet with local township planning committees.

The role of the planner was just as delineated in the published guidelines "not to dominate the process". The role of the planner has been to act in a manner which would facilitate the process by providing technical assistance and aiding in the educational process. From the county-wide land use planning committee, ten members were selected by the planner, with the

consent of the county commissioners, to form a coordinating committee. Much of the planner's activity has been associated with this coordinating committee. The committee met with the planner approximately twice per month to discuss county-wide and local issues regarding land use.

Thus, public participation as a process grew and developed as planning activities continued and the plan began to evolve. The flexibility of the public participation program allowed for continuous inclusion of individuals as issues surfaced and then receded. An objective was to include as many people as possible and, at the same time, not require that participants attend a set number of meetings or other requirements which, in many cases, tend to become exclusionary. The opportunities for citizens to provide input into the planning process have been multifaceted, ranging in scale from the personal one-to-one contact, the impersonal survey form to civic club meetings, township meetings and county-wide meetings. The opportunity for input is and always has been available. This is particularly a result of the organizational structure previously described. Although well organized, the process is flexible, allowing citizens to enter into the process at any point and at any level of participation they desire to assume. Although the structure of the process is open, that does not mean that every citizen of the county has taken advantage of the opportunity and to imply that this was fact would be erroneous. The basic point of the public participation element, however, was not to "make sure" everyone

participated, only to give them this valuable opportunity.

The determination of the number of people directly providing input into the plan is difficult to make. The process involves not only the coordinating committee, but also the township committees and the various public meetings. Initially, the educational process provided the first opportunity for input, in fact, that initial contact in many cases determined some of the basic issues. From a statistical standpoint, approximately 30-40 percent of the county residents have provided direct input by attending planning meetings, completing the survey, or requesting additional information from the planner. This percentage includes individuals from all walks of life and every social segment of the county. One important group in the planning process are the young, especially those in high school. This group will become the future leaders of the county, or they will make a decision to relocate; in either case, the reasons behind their personal decisions are important to the county and its future. Perhaps the only group which has not been represented to a great degree is the non-resident property owner. However, this was not the result of a conscious effort to do so, only a by-product of the attempt to achieve maximum public participation among those residents who are full-time residents of the county.

A significant aspect of the public participation program has been the participation of the County Commissioners. From the inception of the CAMA program they have had a dual role, acting in their capacity of the decision makers and also as citizens of

the county. The Commissioners have been active members of the local township planning committees and most importantly they have attended almost all the meetings scheduled in their townships. This process enables the Board members to evaluate the plan from two viewpoints and hopefully will add a greater commitment from them when the plan is adopted and the implementation phase is initiated.

The evaluation of the public participation program in Hyde County is difficult, especially in terms of quality, and in absence of a definition of the word. Recognizing, however, that no planning of this type nor of this scale has ever occurred in the county previously, the reaction of the county residents has been significant. The impact of the public participation includes not only the planning associated with the CAMA process, but also new planning initiated in other areas as well, including health care.

The measurement of the success of the public participation program at the bottom line will be realized when the plan is finally adopted and the degree to which the policies, standards and the development plan are followed by the decision makers. However, in terms of attempting to avail the planning process to all citizens of the county, the process has been successful. Every township had not only public meetings, but also civic club and planning meetings. It must be noted, however, that not all areas of the county were as actively involved as others; although this is to be expected, everyone is not an active participant in the affairs of their community regardless of the issues.

## CONSTRAINTS UPON DEVELOPMENT

## Constraints Upon Development

This section of the county's Land Use Plan is a discussion of various factors which would tend to constrain development within the county. These constraints fall into two major categories - those relating to land potential and those dependent upon the existing capacity of community facilities. The basic considerations included in the land potential evaluation and analysis are physical limitations, fragile areas and areas with resource potential.

### Physical Limitations

Physical limitations upon development include both man-made and natural hazard areas, soil suitability factors and sources of water supply. Man-made hazard areas in Hyde County are limited to existing and proposed airports. The county currently has four landing strips, one of which is paved, located on the Island of Ocracoke. That landing strip, however, poses no limitations upon development since it is located on land under the jurisdiction of the National Park Service. Likewise, the three other landing strips, located in Fairfield, Lake Landing and Swan Quarter Townships, pose few, if any, limitations upon development. A new air facility is proposed for the Engelhard area on the north side of U. S. 264 approximately three miles northeast of Engelhard. Depending upon the ultimate design capabilities of that facility, development in the adjacent area should be designed to discourage or eliminate encroachment of



development under the landing and take-off flight paths.

#### Natural Hazard Areas

Natural hazard areas are areas which have been identified as being susceptible to erosion or to coastal flooding. Erosion has been subdivided into two classes, ocean erodible areas and estuarine erodible areas. Hyde County has both types of erosion phenomena. The ocean erodible areas are defined as areas above the mean high water where excessive erosion has a probability of occurring. The only area within the county that is affected by ocean erosion is Ocracoke Island. Recent studies published by the Office of Water and Air Resources of the N. C. Department of Natural and Economic Resources reflects that the portion of the island with the greatest potential for ocean erosion is under the jurisdiction of the U. S. National Park Service. Therefore, as a limitation upon development, ocean erosion appears not to be a serious factor especially since the Village of Ocracoke is located on the soundside of the island.

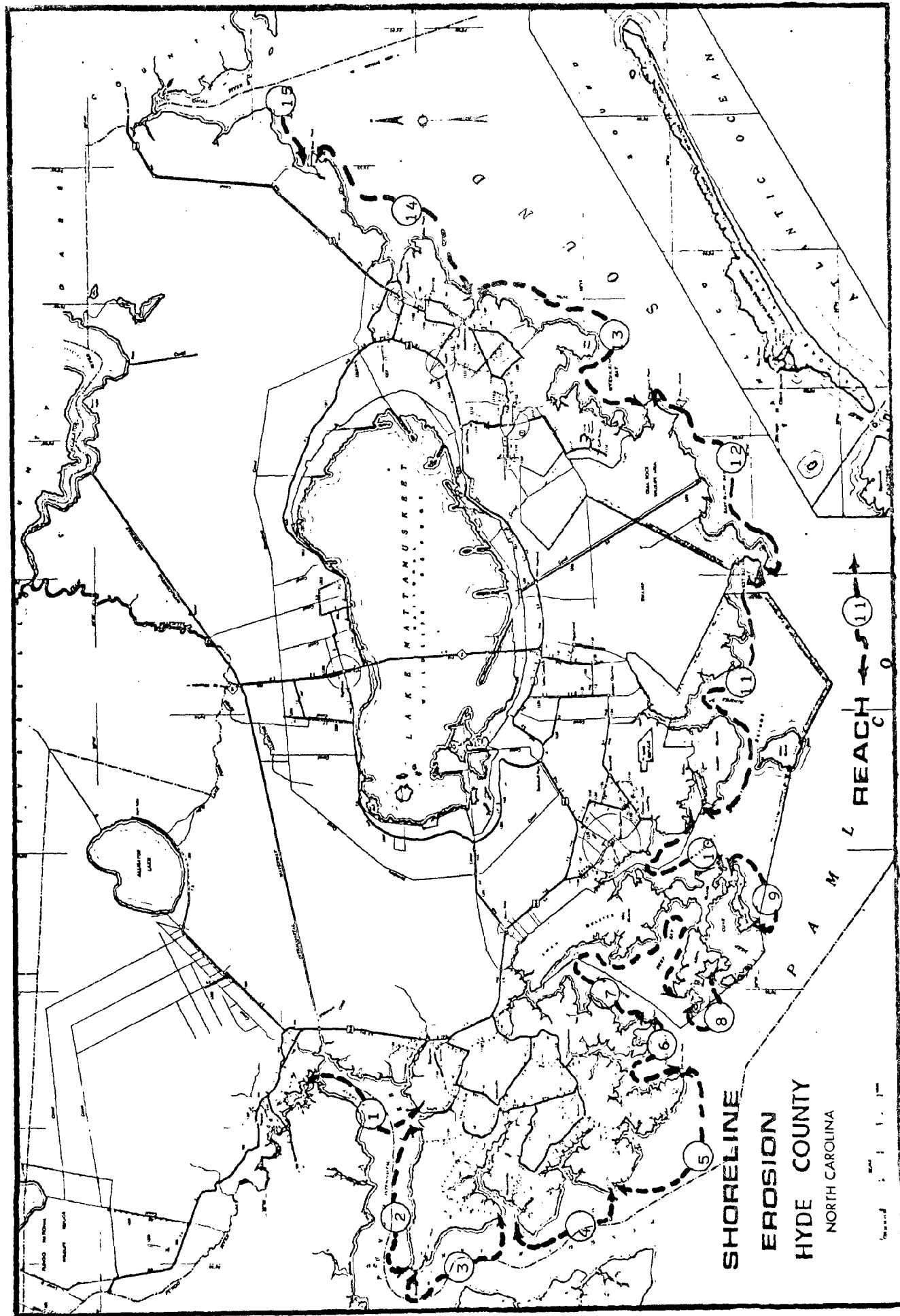
Estuarine erodible areas, on the other hand, affect the total mainland area of the county which is adjacent to the Pamlico Sound and the Pungo River. The Soil Conservation Service in August, 1975, published a study entitled Shoreline Erosion Inventory of North Carolina. That report denotes that the average width of estuarine erosion for the past twenty-five (25) years is seventy-five (75') feet, or an average of three feet per year. The significance of this hazard area is that the dynamic force of erosion must be recognized and if development

occurs within the area with the potential for erosion, special design or protective measures must be taken to minimize the likelihood of significant property loss.

In addition to erosion, the county is affected by flooding. Coastal flood plains are defined as the land areas adjacent to coastal sounds, estuaries, or the ocean which are prone to flooding from storms with an annual probability of one percent or greater (100 year storm). The extent of these areas is to be determined by the state geologist.

Hyde County has recently qualified for the National Flood Insurance Program which provides an opportunity for county residents to purchase low cost insurance to provide additional coverage in the event that storm waters partially or completely damage structures on their property. At the same time, the insurance program requires that certain building specifications be met prior to the construction of new structures, if they are to be located in a flood prone area.

In accordance with the U. S. Geological Survey findings, much of the county is subject to flooding should the 100-year storm occur. Therefore, prior to development of any scale, the identification of the applicable flood proofing measures required should be made. The most severe flooding is likely to occur on land adjacent to the Pamlico Sound with the impact of flood waters declining in the northwestern portions of the county.



# HYDE COUNTY

## REACH NO. 1

Av. width lost to erosion	75.0 feet
Av. height of bank	1.1 feet
Length of shoreline eroding	16.3 miles
Length of shoreline accreting	0 miles
Total length of shoreline	16.3 miles

## REACH NO. 2

Av. width lost to erosion	75.0 feet
Av. height of bank	2.1 feet
Length of shoreline eroding	7.4 miles
Length of shoreline accreting	0 miles
Total length of shoreline	7.4 miles

## REACH NO. 3

Av. width lost to erosion	75.0 feet
Av. height of bank	1.8 feet
Length of shoreline eroding	14.6 miles
Length of shoreline accreting	0 miles
Total length of shoreline	14.6 miles

## REACH NO. 4

Av. width lost to erosion	75.0 feet
Av. height of bank	1.8 feet
Length of shoreline eroding	12.3 miles
Length of shoreline accreting	0 miles
Total length of shoreline	12.3 miles

## REACH NO. 5

Av. width lost to erosion	75.0 feet
Av. height of bank	.7 feet
Length of shoreline eroding	13.8 miles
Length of shoreline accreting	0 miles
Total length of shoreline	13.8 miles

## REACH NO. 6

Av. width lost to erosion	75.0 feet
Av. height of bank	.5 feet
Length of shoreline eroding	18.5 miles
Length of shoreline accreting	0 miles
Total length of shoreline	18.5 miles

## REACH NO. 7

Av. width lost to erosion	75.0 feet
Av. height of bank	.5 feet
Length of shoreline eroding	23.8 miles
Length of shoreline accreting	0 miles
Total length of shoreline	23.8 miles

## REACH NO. 8

Av. width lost to erosion	75.0 feet
Av. height of bank	.5 feet
Length of shoreline eroding	21.8 miles
Length of shoreline accreting	0 miles
Total length of shoreline	21.8 miles

## REACH NO. 9

Av. width lost to erosion	75.0 feet
Av. height of bank	.5 feet
Length of shoreline eroding	6.7 miles
Length of shoreline accreting	0 miles
Total length of shoreline	6.7 miles

## REACH NO. 10

Av. width lost to erosion	75.0 feet
Av. height of bank	.5 feet
Length of shoreline eroding	18.8 miles
Length of shoreline accreting	0 miles
Total length of shoreline	18.8 miles

## REACH NO. 11

Av. width lost to erosion	75.0 feet
Av. height of bank	.5 feet
Length of shoreline eroding	19.2 miles
Length of shoreline accreting	0 miles
Total length of shoreline	19.2 miles

## REACH NO. 12

Av. width lost to erosion	75.0 feet
Av. height of bank	.5 feet
Length of shoreline eroding	14.9 miles
Length of shoreline accreting	0 miles
Total length of shoreline	14.9 miles

## REACH NO. 13

Av. width lost to erosion	75.0 feet
Av. height of bank	.5 feet
Length of shoreline eroding	20.5 miles
Length of shoreline accreting	0 miles
Total length of shoreline	20.5 miles

## REACH NO. 14

Av. width lost to erosion	75.0 feet
Av. height of bank	.5 feet
Length of shoreline eroding	15.3 miles
Length of shoreline accreting	0 miles
Total length of shoreline	15.3 miles

## REACH NO. 15

Av. width lost to erosion	75.0 feet
Av. height of bank	.5 feet
Length of shoreline eroding	11.1 miles
Length of shoreline accreting	0 miles
Total length of shoreline	11.1 miles

### Soil Limitations

The limitations upon development as a result of soil suitability factors include the following elements: area of shallow soils, poorly drained soils, areas representing hazards to foundations, and soils which impose limiting factors upon the use of septic tanks. It may generally be stated that the soil conditions, in their natural state, pose limitations upon most forms of development. The principle reasons for the limitations are the existence of a high water table and poor drainage capabilities. The end result is that there are areas which impose limitations upon the use of septic tanks for disposal of waste water.

The limitations upon agricultural development are generally associated with the need for adequate drainage due to a high water table. The county's drainage pattern includes numerous slow moving canals and ditches flowing into the Pamlico Sound, Pungo River and Alligator River. The natural topography is inadequate for the removal of storm water; therefore, man-made canals and ditches have been located throughout the county. The man-made system becomes the only means of water removal subsequent to severe storms.

The soil limitations upon residential and commercial development are basically the same as for agricultural development - a high water table. Generally, the water table is an average depth of three feet below the surface; however, the closer one goes toward the Pamlico Sound, the higher the water table. The

result is that houses and businesses cannot be constructed with basements. The general rule is that dwelling units are constructed on approximately three or four cinder block pilings above the ground.

This factor, however, is not the greatest limitation upon development. The most important consideration is the ability to dispose of wastewater. The county does not have a central sewage disposal system; thus, reliance upon septic tanks is universal. The implications of a high water table and inadequate soils upon on-lot disposal systems are obvious. Thus, future development in areas exhibiting the aforementioned characteristics will no doubt require either large lots or a central sewage system.

The following map illustrates the location and distribution of the six soil associations found in the county. The map was originally produced by the Soil Conservation Service. The interpretations of the soil associations reflect that virtually all the soil associations impose limiting factors upon the operation of septic tanks; however, these limitations may be reduced or eliminated through intense maintenance, or special design and soil reclamation projects. All alternatives are not only difficult but costly; however, they are not unrealistic. It must be noted that although the indications are that the limitations are county-wide, each new development proposal must be evaluated on a case by case basis.



TABLE XI  
HYDE COUNTY SOIL INTERPRETATION FOR  
SELECTED DEVELOPMENTAL ACTIVITIES

SOIL ASSOCIATIONS	% OF COUNTY	% OF ASSOCIATION	DWELLINGS WITH SEPTIC TANKS	LIGHT INDUSTRIES	ROADS AND STREETS	SUITABILITY FOR AGRICULTURE
1. Myatt-Bladen Myatt Bladen	7	55 30	Sev. Wt. Fl. Sev. Wt. Fl.	Sev. Wt. Fl. Sev. Wt. Fl.	Sev. Wt. Fl. Sev. Wt. Fl.	Good Good
2. Weeksville- Pasquotank Weeksville Pasquotank	11	65 20	Mod. to Sev. Wt. Mod. to Sev. Wt.	Mod. to Sev. Wt. Mod. to Sev. Wt.	Mod. to Sev. Wt. Mod. to Sev. Wt.	Good Good
3. Hyde-Bayboro Hyde Bayboro	12	40 40	Sev. Wt. Fl. Perm. Sev. Wt. Fl. Perm.	Sev. Wt. Fl. Sev. Wt. Fl.	Sev. Wt. Fl. Sev. Wt. Fl.	Good Good
4. Capers-New Han. Capers New Han.	8	65 25	Sev. Wt. Fl. Sev. LFC.	Sev. Fl. Cor. Sev. Fl.	Sev. Fl. Mod. Texture	Poor Poor
5. Dare-Pungo-Dorovan Dare Pungo Dorovan	20	35 35 15	Sev. Fl. Sev. Fl. Sev. Fl.	Sev. Fl. Cor. Sev. Fl. Cor. Sev. Fl. Cor.	Sev. Fl. TSC. Sev. Fl. TSC. Sev. Fl. TSC.	Poor Poor Poor
6. Ponzer-Belhaven Wasoa Ponzer Belhaven Wasoa	30	40 30 15	Sev. Wt. Fl. Sev. Wt. Fl. Sev. Wt. Fl.	Sev. Fl. Wt. Sev. Fl. Wt. Sev. Fl. Wt.	Sev. Fl. TSC. Sev. Fl. TSC. Sev. Fl. TSC.	Good Poor Good

SOURCE: United States Department of Agriculture, Soil Conservation Service,  
Raleigh, North Carolina, 1974.



Notes for Soil Interpretations:

Moderate (MOD): Soils have properties moderately favorable for the rated use. Limitations can be overcome or modified with planning, design, or special maintenance.

Severe (SEV): Soils have one or more properties unfavorable for the rated use. Limitations are difficult and costly to modify or overcome, requiring major soil reclamation, special design or intense maintenance.

Abbreviations for Limiting Factors:

Fl.	Flood Hazard
Wt.	Water Table
Cor.	Corrosion Potential
TSC	Traffic Supporting Capacity

The suitability of soils for agricultural production was based upon the production of corn, soybeans and other small grain crops only.

### Water Supply Areas

Commercial, residential or agricultural development is also dependent upon adequate supplies of potable water. There are basically two sources of water - ground water and surface water. In terms of availability, surface water in the county is abundant. Approximately one-half of the county's surface is covered by water. This includes the various lakes, rivers and the Pamlico Sound. Unfortunately, due to their high concentrations of salt, the brackish conditions render them useless as a source of potable water without desalinization or other costly treatment.

Therefore, the major source of water supply for the county is ground water. There are two aquifers supplying water to the county. The Castle Hayne aquifer consisting of predominantly porous shell, limestone, and calcareous sand is a highly productive source of water supply for the northwestern portion of the county. In that section of the county individual wells may produce from 50 to 500 gallons per minute. The Castle Hayne aquifer lies approximately 250 feet below the surface, although many wells are only 40 feet deep and can obtain water from the aquifer.

The principal source of ground water supply for the county is the Yorktown Formation. This aquifer is above the Castle Hayne and is composed of interbedded marls, massive clays, sands, and shells. Wells drilled into the aquifer range from 125 feet in the west to 250 feet in the eastern portions of the county. Yields from the Yorktown Formation have been reported to be 50 gallons per minute from a two inch diameter well.

The recharge of the Yorktown Formation is directly at the point of out crop and indirectly by the seepage of water through the overlying surficial sands. Overlaying the Yorktown Formation is a non-artesian or water table aquifer. This aquifer is the most widely used source for domestic wells throughout the county. This aquifer is recharged directly by precipitation and surface storage. It is this non-artesian aquifer which is most susceptible to contamination from septic tanks or other sources of ground water pollution.

At the present time, much of the county is in the process of obtaining water from a central water supply system. For a complete discussion of the county's central water system, please refer to the Community Facilities element of this document.

In terms of development, the most important areas of the central water system are the well fields. Well fields are located at Swan Quarter, Engelhard and a new field is being prepared in Fairfield.

#### Ocracoke Water Supply

The previous section has considered the water supply picture for only the mainland. The main source of water supply for the island has been obtained from either shallow wells or cisterns. The wells are far from adequate in terms of volume required and quality-producing water with higher than normal saline content. Since this supply is from a shallow strata it is subject to pollution from septic tanks; and subsequent to storms, water

supplies are often contaminated by salt spray. The roof top catchment areas are also susceptible to bacterial contamination.

The ground water supply is adequate for the full time residents of the island; however, it falls far short during the peak use periods during the summer. To reverse this current situation, the island has recently received funding for a central water supply system. Due to a lack of adequate aquifers, the key component of the system will be a desalinization unit. For a complete discussion, refer to the section covering Community Facilities.

#### Excessive Slope

There are no areas in Hyde County under the jurisdiction of the local government where the slope exceeds or approaches twelve (12%) percent.

NATURAL FRAGILE AREAS

## Fragile Areas

The following section is an inventory of the various elements which may tend to limit development due to their environmental characteristics. These factors include the following: coastal wetlands, estuarine waters, public trust waters, complex natural areas, estuarine erodible areas and areas which sustain remnant species. The significance of these areas is that they are to be considered for designation as Areas of Environmental Concern, in accordance with Section 113A-114 of the Coastal Area Management Act of North Carolina. These areas include both land and water resources in which uncontrolled or incompatible development might result in irreparable damage, thus causing a degradation of some factors which have made the coastal area both aesthetically and ecologically rich.

The Act requires the identification of these environmentally sensitive areas, describing the types of land use which may be permitted in each classification. These land uses must be consistent with established policy objectives and standards which have been published in the guidelines.

### Coastal Wetlands

The classification of coastal wetlands comprises two elements: the low tidal marsh which is affected by the ebb and flow of lunar tides, and other coastal marsh lands. In accordance with the Act's definition, Hyde County is known to contain approximately 1,600 acres of regularly flooded salt marsh. This

HYDE COUNTY

FRAGILE AREAS

LEGEND:



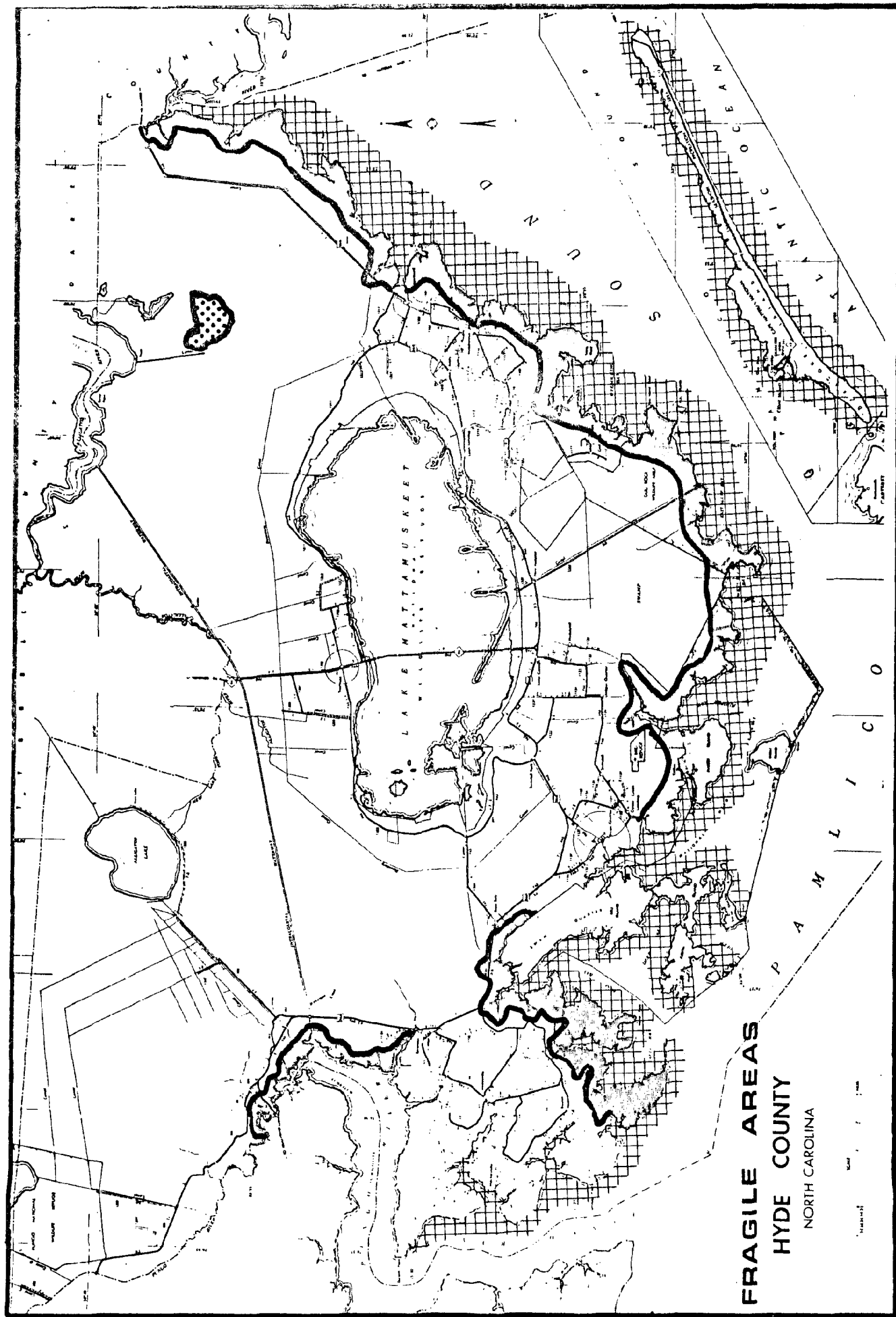
ESTUARINE WATERS



COASTAL MARSHLANDS



COMPLEX NATURAL AREAS





total acreage is located on the sound side of Ocracoke Island, within that portion of the island under the jurisdiction of the U. S. National Park Service--The Cape Hatteras National Seashore. Thus, for developmental purposes, the county may consider that no regularly flooded tidal salt marsh exists.

On the other hand, significant acreage of the county is classified as "other coastal marshland," approximately 39,900 acres. That acreage includes irregularly flooded salt marsh and shallow fresh water marsh, the latter being only 3,400 acres. The term "other coastal marsh" is defined to include any marshland which is inundated only as a result of wind tides, except hurricanes and severe tropical storms.

The significance of these areas is, that depending upon their biological and physical conditions, they are capable of supporting a greater diversity of wildlife types than the limited habitat of the low tidal marsh. For example, the irregularly flooded salt marsh of the county provides not only nutrients for shell and fin fish, but also provides habitat for racoon, muskrat, otter and black duck. In addition, these same areas serve as a deterrent to shoreline erosion, especially in marshes containing heavily rooted species of Juncus roemerians, known as Black Needlerush.

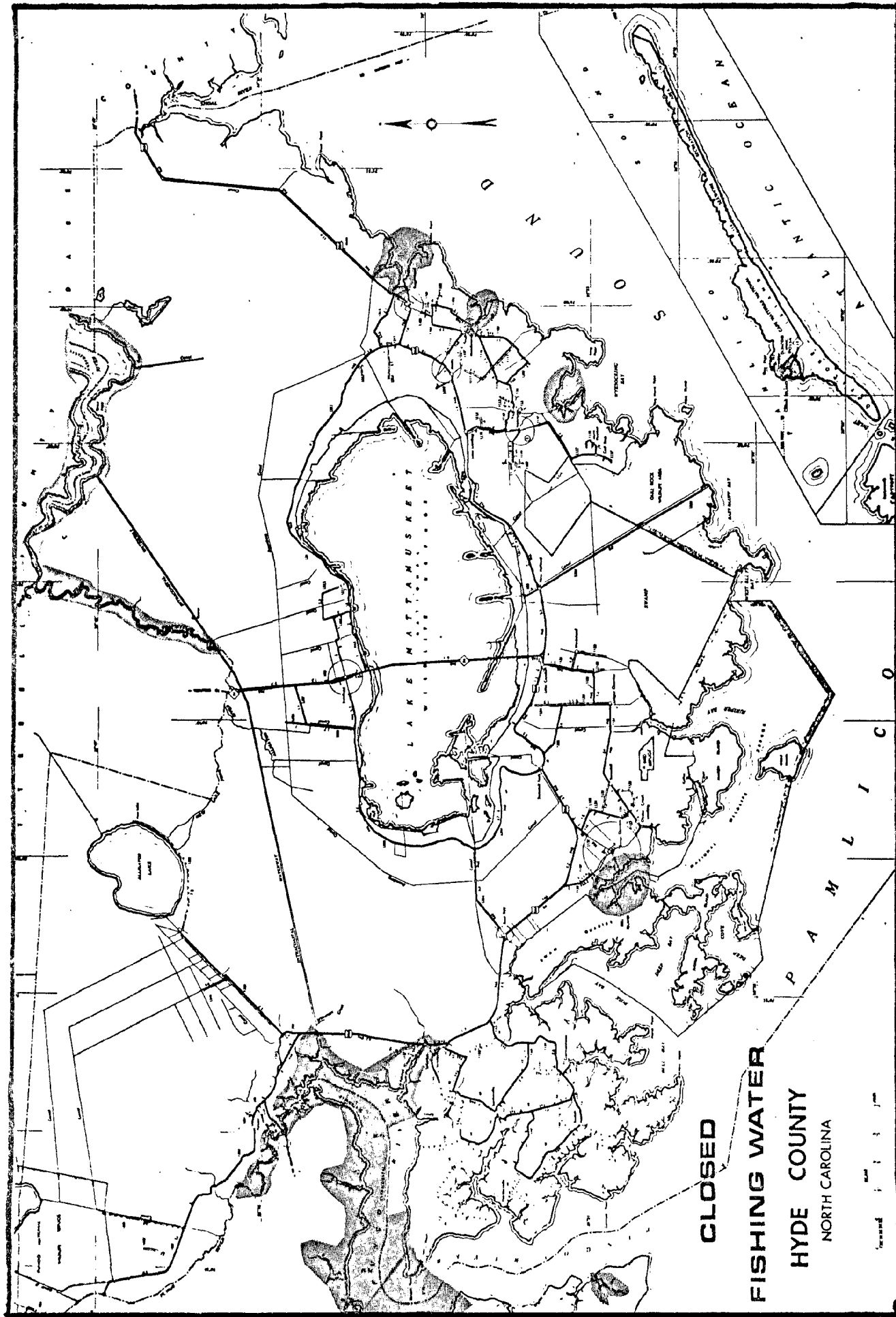
The location of the irregularly flooded salt marsh is extensive and found continuously from the mouth of the Long Shoal River to a point near Able Bay in Currituck Township. Refer to Map 7 for a graphic illustration. The location of the fresh-water marsh is principally along the western boundary of the

county, on the banks of the Pungo River. Fresh water marsh may also be located at the intersection of N. C. 94 and the intra-coastal waterway.

#### Estuarine Waters

Estuarine waters are defined as "all waters of the Atlantic Ocean within the boundary of North Carolina and all the waters of the bays, sounds, rivers, and tributaries thereto seaward of the dividing line between coastal fishing waters and inland fishing waters..." Hyde County contains vast areas which are included within this classification: the waters of the Pamlico Sound, Pungo River and Alligator River which are adjacent to the land area of the county. The most complex area of the county, concerning this classification, is the southwest quadrant of the county, due to the numerous small tributaries which flow into either the Pungo River or the Pamlico Sound.

The significance of the estuarine system is that it is one of the most productive natural environments of North Carolina. It not only supports valuable commercial and sports fisheries, but it is also utilized for commercial navigation, recreation and aesthetic purposes. Species dependent upon estuaries include menhaden shrimp, flounder, oysters and crabs. These species make up over 90 percent of the total value of North Carolina's commercial catch. These species must spend all or some part of their life cycle in the estuary. The high level of commercial and sports fishing in coastal North Carolina is dependent upon the protection and sustained quality of our



estuarine areas.

The great majority of fish and waterfowl that depend upon the estuarine area for their existence is migratory. Adult fish spawn off-shore, the eggs and larvae drift inshore and the young migrate into the estuaries which provide protection and an abundance of rich food. Therefore, the environmental conditions in the estuarine nursery grounds influence their survival, and these conditions fluctuate greatly. Map 4 illustrates the prime fishing and spawning areas in the county for shell and fin-fish. Map 8 indicates those areas currently closed to shell fish harvesting due to some form of pollution.

The complete and total preservation of the estuarine waters, much like areas of coastal marshlands, is impractical and no doubt impossible. Reduction in the productivity of these areas will occur as development occurs and/or greater national benefits are derived. However, careful planning of proposed uses within estuarine waters is needed to minimize the destruction of fisheries habitat, thereby approaching an optimal balance between development and the environment. The management of our estuarine areas for the greatest national benefit means that decisions must be made and compromises reached.

The extent of the estuarine system in Hyde County is vast, extending from the mouth of the Long Shoal River at the Dare County line in the Northeast and extending westward to the head waters of the Pungo River in the northwestern portion of the county. In addition to that area, the waters of the

Alligator River from Cherry Point Landing to the Albemarle Sound are part of the estuarine system. The Pamlico Sound, for example, is approximately 48,000 acres, measured from Wysocking Bay to Rose Bay and extending an average width of two miles. A complete recording of the areas included in the county's estuarine system may be found in Catalog of Inland Fishing Waters of North Carolina.

#### Public Trust Waters

Public trust waters are defined as "all waters of the Atlantic Ocean and the lands thereunder from the mean high water mark to the seaward limit of state jurisdiction; all natural bodies of water subject to measurable lunar tides and lands thereunder to the mean high water mark; all navigable natural bodies of water and the lands thereunder to the mean or ordinary high water mark, as the case may be, except privately owned lakes having no public access; all waters in artificially created bodies of water in which exists significant public fishing resources or other public resources, which are accessible to the public by navigation from bodies of water in which the public has rights of navigation; all waters in artificially created bodies of water in which the public has acquired rights by prescription, custom, usage, dedication or any other means."

The significance of the public trust waters is that the public has certain rights to these areas including navigation and recreation. These waters support valuable commercial and sports fisheries, have aesthetic value and are important

potential resources for economic development. With respect to economic development, one factor of a public trust waters' potential is reflected in the stream classification system of North Carolina.

The stream classification system is based upon the existing or contemplated best usage of the various streams and segments of streams in the basin, as determined through studies and evaluations and the holding of public hearings for consideration of the classifications proposed. This classification system was originally adopted by the North Carolina Board of Water and Air Resources on October 13, 1970, and approved by the Environmental Protection Agency on January 20, 1971.

There are four surface water classifications applicable to the county. They are "SA", "SC", "C", and "C-Swamp."

"SA" waters are identified as having a best usage for shellfishing for market purposes and any other usage requiring waters of a lower quality. These waters are not to be discharge points for sewage and industrial wastes unless they are treated to the satisfaction of the Board of Air and Water Resources and the State Board of Health. The waters of the Pamlico Sound and adjacent Bays are classified as "SA" waters.

"SC" waters are identified as having a best usage for fishing and any other usage except bathing or shellfishing for market purposes. The waters are suitable for fish propagation. These waters may be receiving areas for sewage disposal only to the extent that after a reasonable opportunity for dilution and

HYDE COUNTY

STREAM CLASSIFICATION

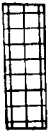
LEGEND :



SC



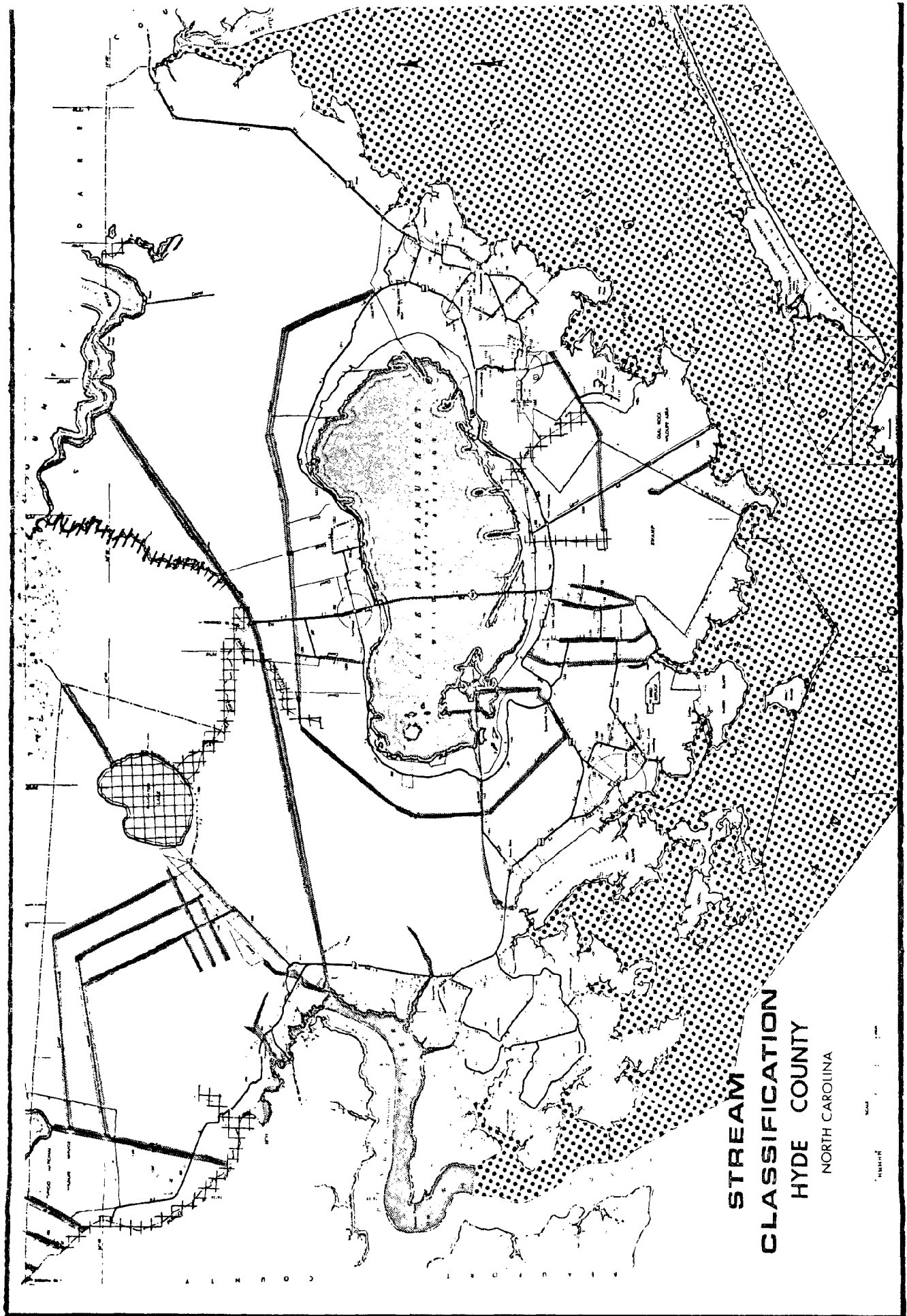
SA



C SWAMP



C





mixtures makes the waters unsafe or unsuitable for fish, shellfish and wildlife. Many of the larger canals within the county fall within this classification. Larger bodies of water included in this classification are the waters of Lake Mattamuskeet and the Pungo River, north of Slade Creek.

Class "C" waters have a best usage for fishing, boating, wading and any other usage except for bathing or as a source of water supply for drinking, culinary or food-processing purposes. The class "C" waters may also be a receiving water for effluent from a sewage treatment plant to the extent that after a reasonable opportunity for dilution and mixtures, makes the waters unsafe or unsuitable for fish, shellfish and wildlife. The "C-Swamp" classification indicates that the stream drains swamp type lands and has the same potentials as the class "C" waters.

#### Areas that Sustain Remnant Species

Areas that sustain remnant species are designated as places which support native plants or animals, rare or endangered, within the coastal area. The continued survival of certain native plants and animals cannot be assured unless the relatively few well defined areas providing necessary habitat conditions are protected from development or land uses that might alter these conditions. The policy objective is to preserve these habitat conditions, minimizing land uses which might jeopardize these known areas.

A report recently published by the North Carolina Wildlife Resources Commission states that the rare and endangered species

of the county include the brown pelican which is known to nest in the vicinity of the Ocracoke Inlet, the bald eagle, peregrine falcon, American alligator, red-cockaded woodpecker and the loggerhead turtle. The Outer Banks King Snake, which is an endangered species, is also known to be on Ocracoke Island. Recognizing that endangered or remnant species exist in the county, unfortunately does not completely solve the ultimate question of their protection. Until explanatory data regarding the specific environments is received, designation of management areas is impossible to make. Forthcoming legislation will make it possible to assemble more pertinent data about these species.

#### Complex Natural Areas

Complex natural areas are defined as "lands that support native plant and animal communities and provide habitat conditions or characteristics that have remained essentially unchanged by human activity." These areas are to be determined to be rare within the county or to be of particular scientific or educational value.

The significance of these areas is that they provide the few remaining examples of conditions that existed within the coastal area prior to settlement by Western man. Often these natural areas provide habitat conditions suitable for rare or endangered species, or they support plant and animal communities representative of pre-settlement conditions. These areas provide a historical perspective to changing natural conditions in the coastal area and together are important and irreplaceable

scientific and educational resources.

There are two such areas which have been identified within Hyde County. One area is known as Salyer's Ridge Natural Area, located within the Mattamuskeet National Wildlife Refuge. The area is approximately 75 acres in size and includes stands of Loblolly Pine averaging 100 feet in height and Sweet Gum averaging 40 feet in height and 50 years in age. The area is located south of the Refuge's West Main Canal, in the extreme southwest portion of the Refuge.

The other area is located in Lake Landing Township, northeast of Engelhard. The site is owned by Pamlico, Incorporated and is a Cypress swamp. The stand is unique to the county, with some trees exceeding eighteen (18) feet in diameter.

#### Areas Containing Unique Geologic Formations

Hyde County contains no areas of unique geologic formations as defined in the Guidelines.

#### Registered Natural Landmarks

Hyde County contains no registered natural landmarks.

AREAS WITH RESOURCE POTENTIAL

## Areas With Resource Potential

The following section identifies and evaluates those areas of the county with resource potential, including prime agricultural lands, potentially valuable mineral sites, publicly owned forests, parks and other non-intensive outdoor recreational lands.

### Prime Agricultural Lands

Prime agricultural lands are difficult to locate, simply due to the absence of a universally acceptable definition. Therefore, in absence of a definition, one measure of prime agricultural lands may be ascertained from the county soil classification and from certain geographic configurations which are best suited for agricultural production.

The generalized soil map interpretations previously discussed aid in the identification of these agriculturally important areas. The interpretations denote that the following soil associations are rated as "good" for corn, soybeans, and small grains: Myatt-Bladen, Weeksville Pasquotank and Hyde-Bayboro. In addition, the Ponzer-Wasda-Belhaven association is generally rated as good, with only the Ponzer portion rated as poor for agricultural production. Although these interpretations indicate positive implications for agriculture, each tract of land must be individually analyzed. A review of the generalized soil map for the county reflects that approximately sixty (60%) percent of the area is rated good for the production

of corn, soybeans, and other small grain crops.

The geographic configurations which tend to make acreage prime in Hyde County are directly related to land clearing activities and drainage. The existing land use map provides assistance for this discussion. The map reflects that there are several areas which are predominately oriented toward agricultural production. The largest area in terms of aggregate acreage is in Currituck Township, north of the Ponzer community. A vast proportion of that land is owned by one of the corporate ventures in the county. In the future, it may be expected that the majority of the area from the Intracoastal Waterway north and northwest will be actively cultivated.

The Scranton-Sladesville area is another prime agricultural area, especially that area which lies north of the boundary roads, S. R. 1143, S. R. 1145 and west of S. R. 1139. In the future, a majority of this area, with the exception of the road frontage will, no doubt, be under production. The other lands, on the outside, generally exhibit a high watertable level or are classified as wetlands, thus not appropriate for agricultural production.

The next large areas are found around the "lake"; that area between Lake Mattamuskeet and the boundary canal. This includes the Swan Quarter and Rose Bay areas. In addition, the Engelhard area of Nebraska and Middletown have vast areas which have been drained, cleared and under cultivation.

An area which currently is being prepared for agricultural

production is located north of Engelhard. The area, approximately 70,000 acres, may soon qualify as being prime agricultural land. Preliminary production yields have been very promising.

Agricultural production yields in the county have attained the 150 bushels per acre mark for corn production. That yield is also dependent upon climatic conditions; however, one must have the proper lands initially. Within the county, most acreage which is under production is considered to be prime land. This is directly related to the investment of time, money and energy which is required to transform raw land into productive acreage.

Therefore, with respect to population growth and expansion of non-agriculturally related activities, a conflict between land uses may arise. This is particularly true because land which is productive farm land is also highly desirable for development since it is not only cleared but also well drained. In the future, there are two areas of the county which may experience this conflict: the areas of Swan Quarter and Engelhard and the road frontage of U. S. 264. As the water supply system is expanded and completed, pressures for non-agricultural development may increase. The land use decisions regarding growth that will have to be made should take into account the existing land uses and their importance to the county. Development proposals must also be carefully evaluated in terms of their impact upon adjacent land uses, especially for those developments which are proposed and are not within service district boundaries.

## Drainage

Located on the peninsula between the Albemarle and Pamlico sounds, Hyde County is confronted with vast agricultural potentials and constraints. The most important facet of agriculture in the county is the drainage of the land. The drainage issue composes two significant aspects: the maintenance of existing drainage ways and the contruction of new drainage outlets.

The natural drainage of the county, meaning that drainage which existed before man started construction drainage ditches and canals, was limited to a few short streams. Primarily, these streams were the Pungo River and its tributaries on the western boundary of the county, the Alligator River which forms a portion of the county's northern boundary and the Long Shoal River in the extreme northeastern portion of the county. An evaluation of this natural system has not been possible to make due to the numerous alterations made by man.

The soils of the county fall into the mineral or organic classifications. The mineral soils consist of varying mixtures of sand, silt and clay. The organic soils, on the other hand, are referred to as muck or peat, consisting of tree fragments, shrubs and other vegetation mixed with small amounts of inorganic materials. In terms of aggregate size, the latter classification is the dominant soil type which forms the county's land surface. The very properties of that classification not only



present potentially valuable resources for agricultural production once drainage and land clearing activities have taken place.

Historically, the valuable assets of the county have been recognized since the 1800's when the first record of drainage activities was made. In 1830, the State of North Carolina appropriated funds to construct drainage ditches for Lake Mattamuskeet, Pungo and New Lakes. In 1838, the Lake Landing Canal was completed connecting Lake Mattamuskeet to the Pamlico Sound, being approximately five (5) miles in length. In later years, other canals were completed as the attached map indicates. These first canals were excavated for the purpose of promoting development in the area. Those early efforts were generally unsuccessful due to the fear of malaria and superstitions about ill health caused by breathing the air in swampy regions. Although the degree of development may not have reached the desired level, the canals provided new means of access to the county and resulted in the partial drainage of the areas adjacent to the canals. During the late 1800's and the early 1900's the county did experience significant development.

Perhaps the most ambitious development scheme undertaken in the region, prior to recent years, was the attempt to farm the bottom of Lake Mattamuskeet. The lake bottom was considered ideal for agricultural production because it only required drainage, whereas adjacent land areas required both drainage and the removal of vegetation. Thus, in 1917, a stock company was formed to drain and farm the lake's bottom. The endeavor required the

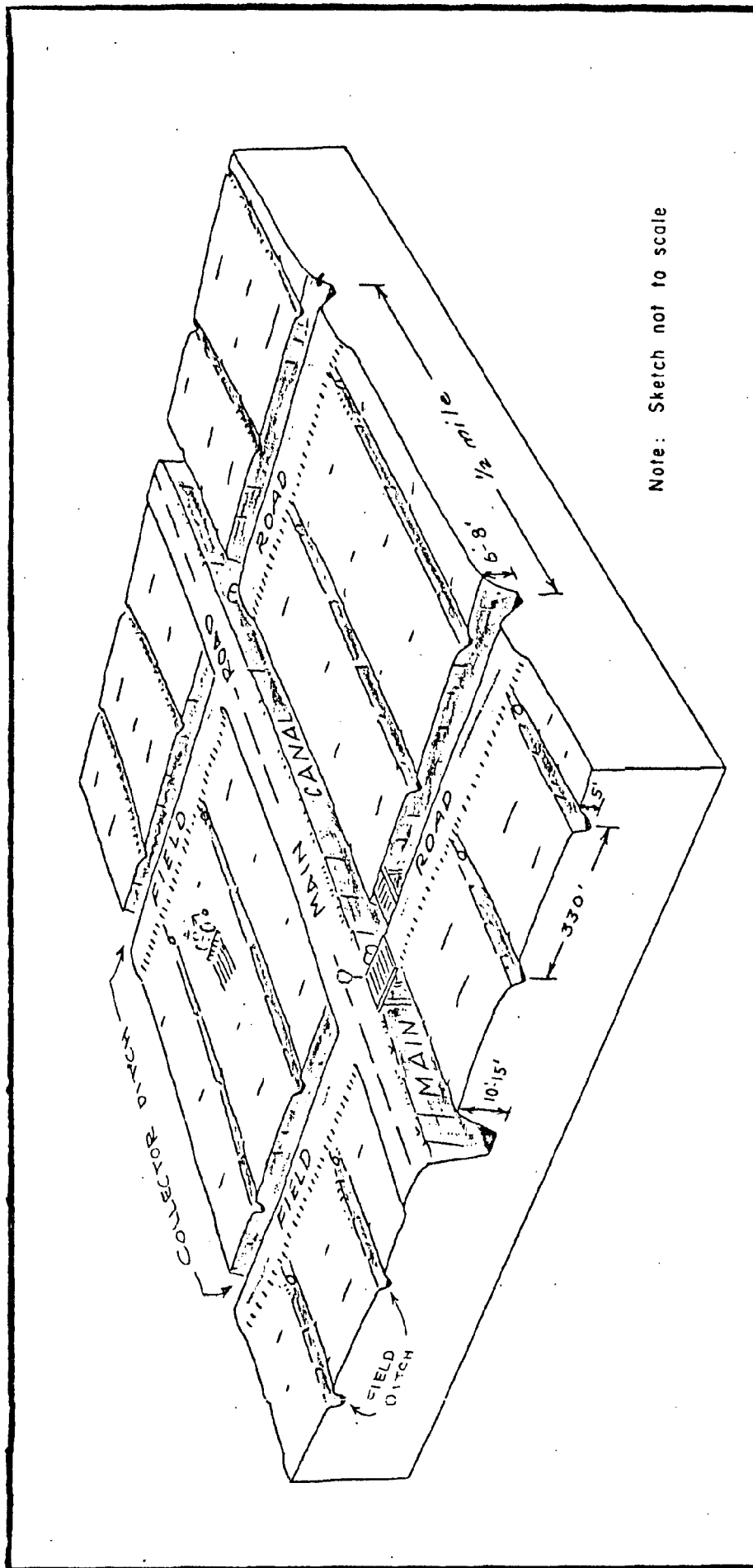
construction of four steam powered pumps, having a combined capacity of one million gallons per minute. This also required the excavation of the Outfall Canal a distance of seven (7) miles. The crops produced record yields during the years the pumps operated; however, not to the extent that profits exceeded costs. Therefore, due to extreme costs, pump failures and other financial difficulties the venture was doomed to failure. However, the crop yields prompted more investment in agricultural production.

A large portion of that investment was associated with land reclamation activities, especially drainage. The conversion of swampy areas, bogs and forest areas to intensive farming operations requires obvious changes to the landscape. A portion of the change is the removal of vegetation which may consist of second or third generation growth of trees and shrubs. Once uprooted, the vegetation must be burned. The second phase consists of the excavation of drainage ditches and canals to remove excess water thus lowering the ground water level, making cultivation possible.

The ideal drainage system consists of three types or sizes of canals. The major element of the network is the main canal, which generally extends from the interior to a natural body of water, either a stream or coastal water area. The width and depth of these canals vary depending upon slope conditions and the area to be drained. In general, however, an average main canal is a minimum of 15 to 25 feet wide and 10 to 15 feet in

depth. The second type of canal in the drainage network is the collector ditch. The function of the collector ditch is to channel surface water from smaller ditches to the main canals. These canals may vary in size, but a majority fall into the 10 to 15 feet wide and 6 to 8 feet deep category. The final aspect of the drainage network is the field ditches or "v" ditches. These ditches perform the function of lowering the watertable and removing the rain water subsequent to rains. These ditches are spaced approximately 330 feet, perpendicular to the collector ditches and varying in width and depth.

Although the drainage network appears to be complex and may approach the "ideal configuration", the effects of continued rain showers are immediately noticeable in the fields. The frequency and duration of rain become the determining variables in the successful operation of a productive farm. Excessive rain causes damage and in some cases, crop loss; and when the county receives excessive rain, it surpasses the normal level of 55 inches. As recently as 1975, the adverse effects of excessive rain have affected the county's agricultural production. The drainage network which traverses the county adequately removes excess water which may occur in normal years; however, they are not designed to carry off rain waters in years when the rainfall exceeds seventy (70) inches. In the past decade, the rainfall has surpassed the eighty-two (82) inch mark approximately five (5) times. In addition to crop damage, the drainage network may also suffer adverse effects.

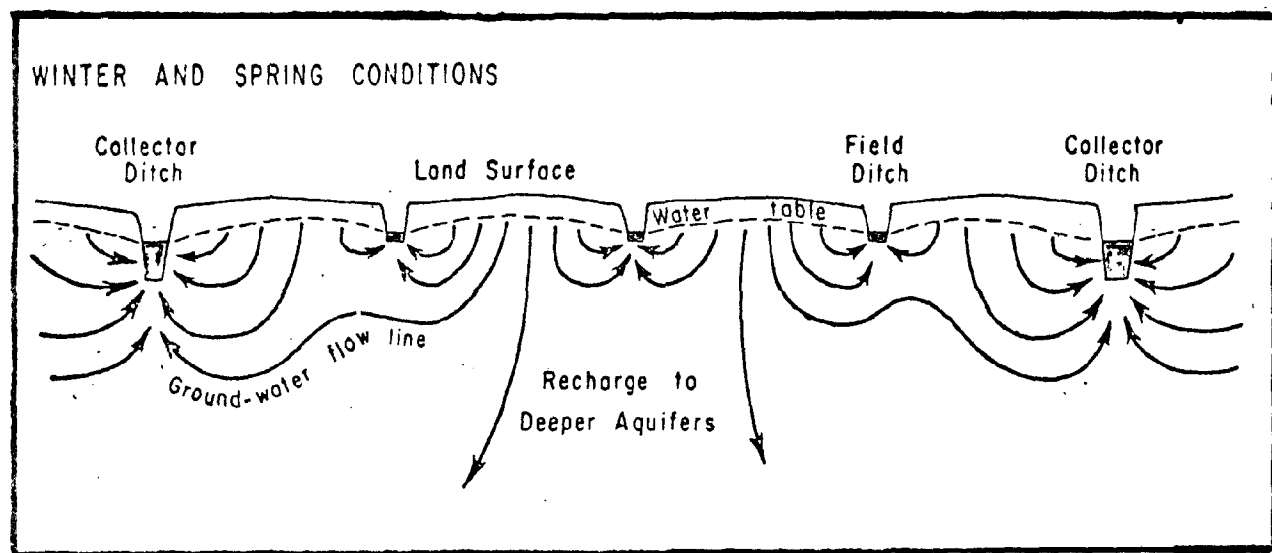
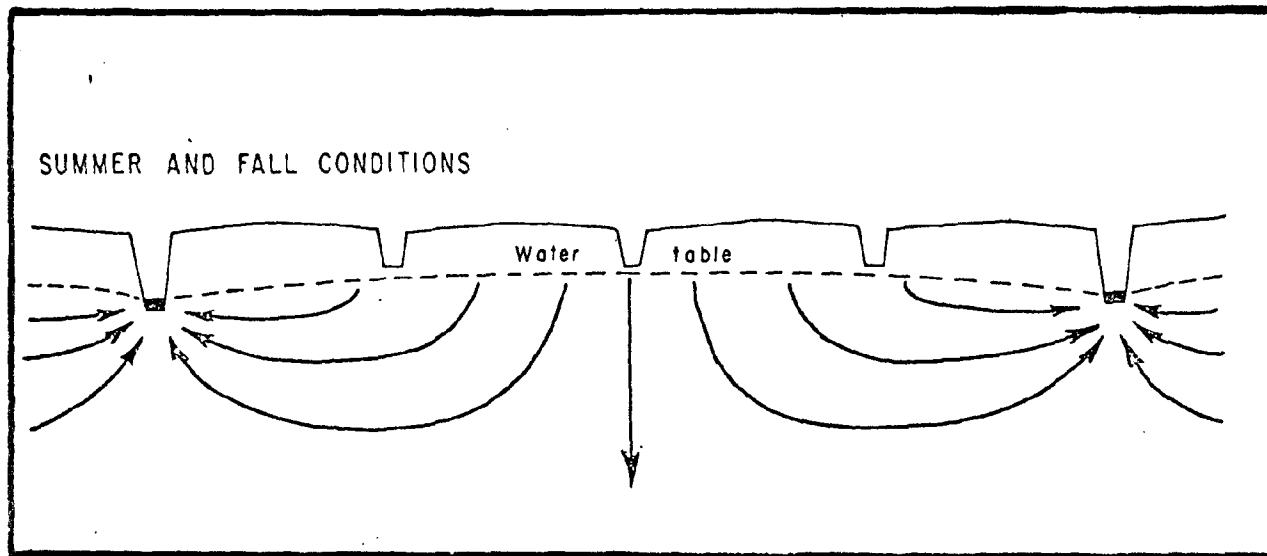


Note: Sketch not to scale

TYPICAL ARTIFICIAL DRAINAGE SYSTEM

The artificial drainage system that has been constructed in the county is designed to prevent ponding of water on the land surface during heavy rains and to remove excess waters. Ponding is reduced by the close spacing of the field ditches and the slope of the fields toward the ditches. The key to ponding is the water table level. The construction of drainage ditches causes seepage of ground water into the ditches lowering the water table level and causing an unsaturated zone below the surface. During rains water infiltrates into this zone; therefore, any overland flow occurs only after the soil is completely saturated or rainfall exceeds the infiltration rate.

Exact data on the seasonal fluctuations of the water table in drained areas is not available. However, utilizing general ground water hydrological principles, coupled with seasonal observations of the water level and drainage ditch flow, it is possible to outline general applicable conditions. The seepage of ground water into the ditches causes the water table to gravitate toward the ditches. The water table divides become most pronounced during the spring and winter when the water table is nearest the surface prior to receding in the summer and fall when evapotranspiration losses are greatest. During the periods when the field and collector ditches are dry, the deeper ditches exercise primary control on the water table. The drainage network lowers the water table approximately three feet during dry periods from the normal one foot level to a position about four feet below the surface.



SEASONAL GROUND WATER FLOW CONDITIONS

Regardless of the cause, the drainage network requires periodic maintenance. Without proper and timely maintenance, crop production cannot occur at normal levels. The process of maintenance can post significant problems to the individual, especially if the drainage way traverses a coastal marshland or discharges directly into the estuarine system. When these conditions are met, and they exist for almost every farmer in the county, a permit is required from the N. C. Division of Marine Fisheries and the U. S. Army Corps of Engineers. The process usually takes in excess of three months and the conditions attached to the permit are indeed difficult to comply with.

Therefore, the county is in the process of obtaining legal authority from the permit-letting agencies which would enable the county's farmers to maintain existing farm drainage rights-of-way in a more realistic manner. The basic elements of that recommendation are as follows:

- a) Provide for the maintenance of all existing drainage rights-of-way,
- b) The establishment of a spoil area for a minimum distance equal to sixteen (16) feet, not to exceed an area equal to twice the average width of the existing water course for spoil disposal,
- c) The spoil area be designed in a manner which will not cause ponding of water behind the spoil bank thus blocking the flow of nutrients into the estuarine system, and
- d) That new or expanded drainage rights-of-way be attained after state and federal permits and requirements are satisfied.

The key to the previous statement concerns the concept of maintaining all existing drainage rights-of-way, regardless of

whether they are natural or man-made. The major obstacles concerning the maintenance of drainage ways have to do with the impact of that activity upon the coastal wetlands and estuaries. In the coastal area, the elevation or topography is approximately at sea-level; therefore, subsequent to rains, the excess water which is not absorbed into the ground must be removed. For the past two hundred years, the method employed has utilized the drainage ditch. These ditches must traverse, in many cases, coastal marshland and then discharge into a portion of the estuarine system.

Coastal marshlands in Hyde County encompass approximately 30,000 acres and generally is composed of irregularly flooded marshland. This means that it is inundated only as a result of wind tides and storm tides, not including hurricanes and severe tropical storms. The location of the irregularly flooded salt marsh is extensive and found continuously from the mouth of the Long Shoal River to a point near Able Bay in Currituck Township. The location of the freshwater marsh is principally along the western boundary of the county, on the banks of the Pungo River. Fresh water marsh may also be located at the intersection of N. C. 94 and the intracoastal waterway. Thus, drainage from almost any section of the county must go through a marshland area. In terms of a marsh's viability, their benefits are dependent upon the aggregate acreage and a reduction of that area by small amounts should have negligible effects upon the total productive capabilities of the marshland. Thus, it must be understood that



it is not necessary to preserve every blade of grass on every marsh; however, the considerations regarding the reduction of salt/marsh area involves the making of intelligent choices since there are no simple solutions. The residents of Hyde County deeply feel that an intelligent choice is for the maintenance of existing ditches. The completion of such projects ultimately destroys very little marsh area, if any, due to the significant aspect of maintenance rather than the excavation of new ditches.

In addition to the significance of the maintenance aspect is another facet regarding the extent of salt marsh areas which currently exist. Within the State of North Carolina only one county exceeds Hyde in total area classified as marsh. The county also contains vast areas of waters which fall into the estuarine system classification. Included in the estuarine system classification are the waters of Pamlico Sound, Pungo River, Alligator River and the Long Shoal River.

The great majority of fish and waterfowl that depend upon the estuarine area for their existence is migratory. Adult fish spawn off-shore, the eggs and larva drift inshore and the young migrate into the estuarine which provide protection and an abundance of rich food. Therefore, the environmental conditions in the estuarine nursery grounds will influence their survival and these conditions fluctuate greatly. Prime spawning areas exist in the county for shell and fin-fish; however, some of those areas are currently closed to shell fish harvesting due to pollution.

The complete and total preservation of the estuarine waters,

much like areas of coastal marshlands, is impractical and no doubt impossible. Reduction in the productivity of these areas will occur due to certain forms of development, based upon the national benefits which can be derived. However, careful planning of proposed uses within estuarine waters is needed to minimize the destruction of fisheries habitat, thereby approaching an optimal balance between development and the environment. The management of our estuarine areas for the greatest national benefit means that decisions must be made and compromises reached.

As stated previously, the residents of the county recognize their close ties to the estuarine system. The specific drainage recommendations reflect that concern as well as the fact that drainage ditches have been maintained for approximately two hundred years and the productivity of the marshland has not been seriously impaired. It would appear that the maintenance of drainage ways has not changed the character of the salt marsh; however, the methods utilized may be improved to insure that the biological functions of the marsh are not impaired. Therefore, the county has suggested that a spoil area be established for each drainage ditch. The minimum distance would be sixteen feet, not to exceed a distance of equal to twice the average width of the existing drainage way. In other words, a drainage ditch averaging twenty feet wide would receive a spoil area of forty feet. Further, to insure the biological functions of the marsh, the county proposes that the spoil area be arranged in a manner which would facilitate the flow of nutrients into the estuarine

system. The proposal calls for the placement of lateral ditches which would cut through the spoil area to the drainage way. These lateral ditches would then allow the marsh to biologically function at their normal level and not cause ponding or trap nutrients subsequent to rainfalls.

The proposals identified above take into account the biological value of both the estuarine system and the land mass adjacent to that system. The drainage issue is the highest priority for the agricultural producer in the county for without dry land, crops cannot be cultivated. Equally, without a healthy estuarine system the commercial and sports fishing industries cannot exist. The residents of the county believe that this proposal will benefit the majority of the people at the local, state and national level.

#### Mineral Sites

The county is underlaid by sedimentary rocks that range in age from Cretaceous to Recent and represents deposition in both marine and non-marine environments. The sediments form a wedge-shaped body, oriented generally in a north-south direction, ranging in thickness from about 1,000 feet in the western portion of the county to about 10,000 feet at Cape Hatteras. Lithologically, the sedimentary formations include beds of limestone, sand, unconsolidated shells, marls, clay and unconsolidated sandstone. Thin beds of indurated sandstone and siltstone occur locally; however, they do not compromise a major lithologic unit. The regional dip of the strata is to the east with gradients ranging from 5 to

15 feet per mile. Throughout most of the area, sediments of the Pleistocene and Recent ages form a layer 25 to 100 feet thick, thus other older deposits are exposed only along the banks of the major streams in the western portions of the county.

The county is reported to have definite deposits of shell, limestone, marls, sand, gravels, ilments (titanium), clays, peat and phosphate. The county is also one of the few in the state which has possible oil and gas deposits in commercial quantities. Although several exploratory wells have been drilled, they have proved to be unproductive.

The most common mineral deposit in the coastal area is phosphate which is available within the county although recovery costs appear too prohibitive for commercial extraction at this time. Thus, the county does not face the prospect of large scale phosphate mining unless technological innovations make it profitable.

#### Publicly Owned Forests and Parks

Within the county, there are both federal and state land holdings for wildlife refuges. These holdings include the Lake Mattamuskeet National Wildlife Refuge, the Swan Quarter National Wildlife Refuge, the Gull Rock Wildlife Area and the Pungo National Wildlife Refuge and the Cape Hatteras National Seashore.

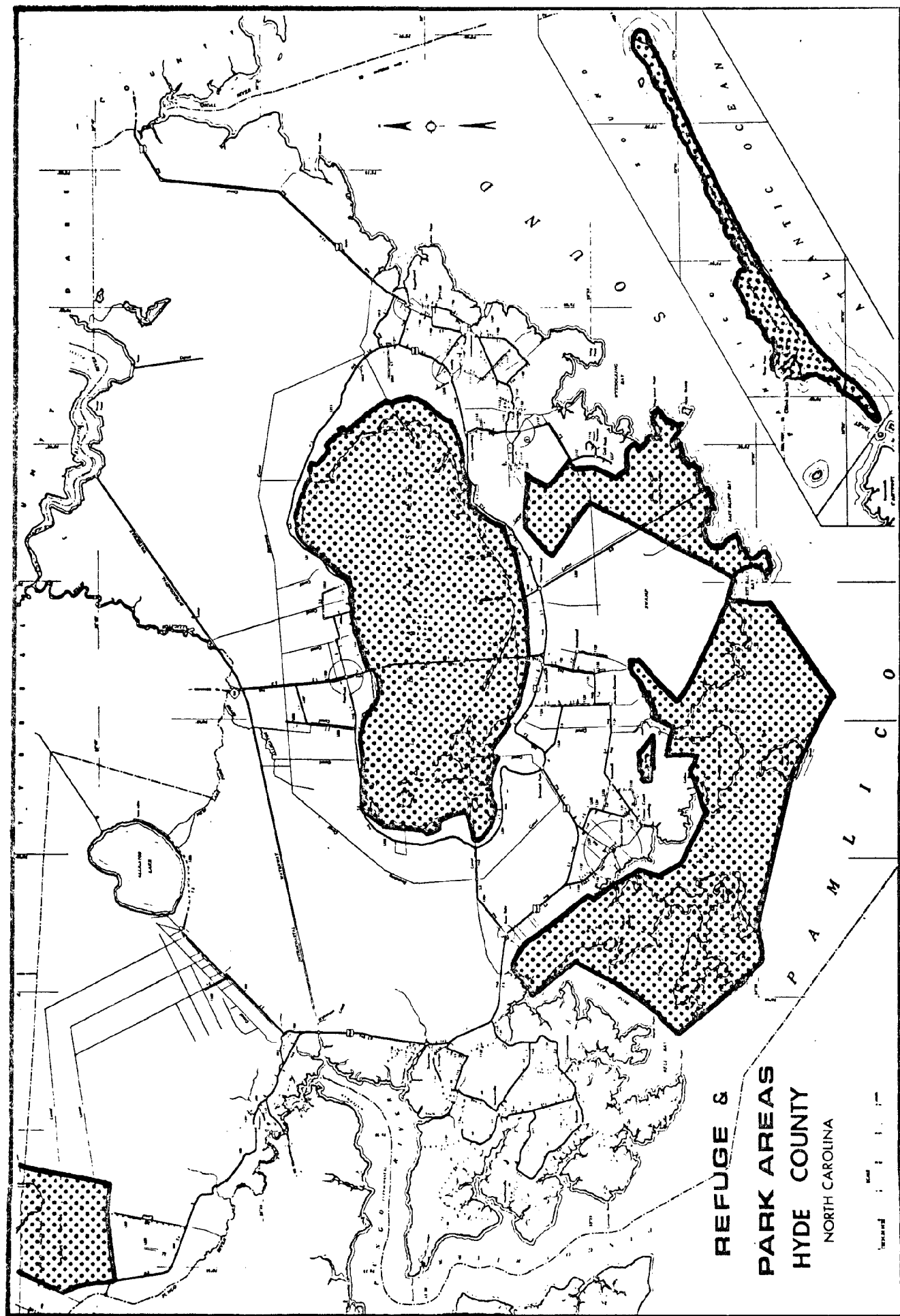
The Lake Mattamuskeet National Wildlife Refuge was established December 18, 1934, for the purpose of a refuge area and breeding ground for birds and wild animals. Until recent years, the refuge was also a shooting area under the management of the

U. S. Department of the Interior and the North Carolina Wildlife Resources Commissions. However, due to low populations of wintering migratory birds, hunting has been discontinued. The lake is the largest in North Carolina, encompassing 50,000 acres. The refuge is most noted as a wintering area for Canadian geese and ducks.

The Swan Quarter National Wildlife Refuge was initiated June 23, 1932 on 15,500 acres located west of the Village of Swan Quarter. Primarily the area is low woodlands or marsh areas and has limited access. The lack of access and development has left much of the refuge as a show case for the exhibition of natural forces: birth, growth, maturity, calamity and death. Therefore, the primary objective of the refuge is to maintain the acreage in a natural setting as much as possible. The refuge is also the wintering area for Diving Ducks and Canvasbacks.

The Gull Rock Wildlife Area is owned and under the management of the State of North Carolina. Approximately 17,313 acres in area, the wildlife area is primarily oriented toward the preservation and management of big game including both deer and black bear. Studies also indicate that the American Alligator may be located in the area between Juniper Bay and Wysocking Bay.

The Cape Hatteras National Seashore incorporates all of Ocracoke Island with the exception of 775 acres within the Village of Ocracoke. The National Seashore is managed by the



National Park Service. The Ocracoke portion of the total area was opened in 1961 to the public and includes two campgrounds and miles of ocean beaches.

The Pungo National Wildlife Refuge is partially located in the extreme northwest section of the county. The primary land holdings of the refuge are located within Washington County.

COMMUNITY FACILITIES



## Capacity of Community Facilities

The element of the county's land use plan is an evaluation of the existing community facilities, including the water supply system, transportation system and school system. Each facility will be evaluated upon the following criteria: capacity, percent utilization and policy regarding expansion. These facilities are important in terms of future growth, especially in terms of expansion costs.

### Sewage System

At the present time, the county does not have a central sewage disposal system. Therefore, the principle method of wastewater disposal is via septic tank systems. In many instances, the septic tanks are either inadequate or the effluent is piped directly into drainage canals. The result is obvious, pollution of surface waters becomes a real possibility. This becomes a critical issue in areas where individuals and families are dependent upon surface waters for water supply.

The outlook or future need for a county-wide sewage disposal system is not justified, based upon the theoretical position that there ought to be approximately one user per hundred feet. However, for areas of higher population concentrations such as Engelhard, Swan Quarter and Ocracoke, central sewage systems may be feasible. However, in order for a public sewage system to be practical, it must be both economically as well as environmentally feasible. Thus, future growth whether it be residential,

commercial or industrial in these towns will be highly dependent upon adequate sewage disposal.

#### Water Facilities

There are several areas of the county which are currently served with public water supplies. The general area includes the areas of Swan Quarter, New Holland and Engelhard. At one time, there were two separate water associations located in Swan Quarter and Engelhard; however, the county in 1975 purchased the two independent systems combining them into one system which is to be expanded into one county-wide water supply system, providing service to Fairfield, Rose Bay and Sladesville.

The former Swan Quarter water system included two deep wells and an elevated water tank, with a storage capacity of 75,000 gallons. The two deep wells are capable of providing approximately 100 gallons of water per minute. Total daily capacity of the supply system is 150,000 gallons with a recorded peak demand of 60,000 gallons per day. Therefore, the system at peak demand has an excess capacity of 90,000 gallons per day, or approximately 60 percent capability.

The Engelhard system also utilizes two deep wells, approximately 200 gallons of water per minute, with a capacity of 144,000 gallons per day. An elevated storage tank with a capacity of 75,000 gallons provides excess capacity as well as unified pressure throughout the system. Like the Swan Quarter system, the Engelhard supply has never approached its full demand. Peak demand upon the system has been approximately 75,000 gallons per

day. Subsequent to the completion of the Engelhard system, it was extended to the New Holland area.

### School Facilities

The county school system consists of four facilities, one located on Ocracoke Island and the remaining three on the mainland. In general, the system has experienced a declining enrollment, and projections reflect that this trend will probably continue until 1978-1979. As of 1975, The Hyde County School Survey, published by the North Carolina Department of Public Instruction, reflected that the elementary schools have a total enrollment of 872 students, while the enrollment of high school students was 359.

The three elementary schools are O. A. Peay in Swan Quarter, Davis School in Engelhard and Ocracoke. O. A. Peay has a current enrollment of 295 in grades Kindergarten through Sixth, with a total capacity of 450. The excess capacity is approximately 155 students. Therefore, as a constraint upon development, the Swan Quarter area is, no doubt, not facing a shortage of classroom space. Davis Elementary School also appears to have excess capacity with an enrollment of 329 students and a total capacity of 375 students.

The Ocracoke School is the most unique educational facility in the county and perhaps in all of North Carolina. The Ocracoke School is a one-room school house having students in grades one through twelve. The school enrollment is approximately 67 with a total capacity of approximately 80-100, depending upon the

HYDE COUNTY  
COMMUNITY FACILITIES

LEGEND:



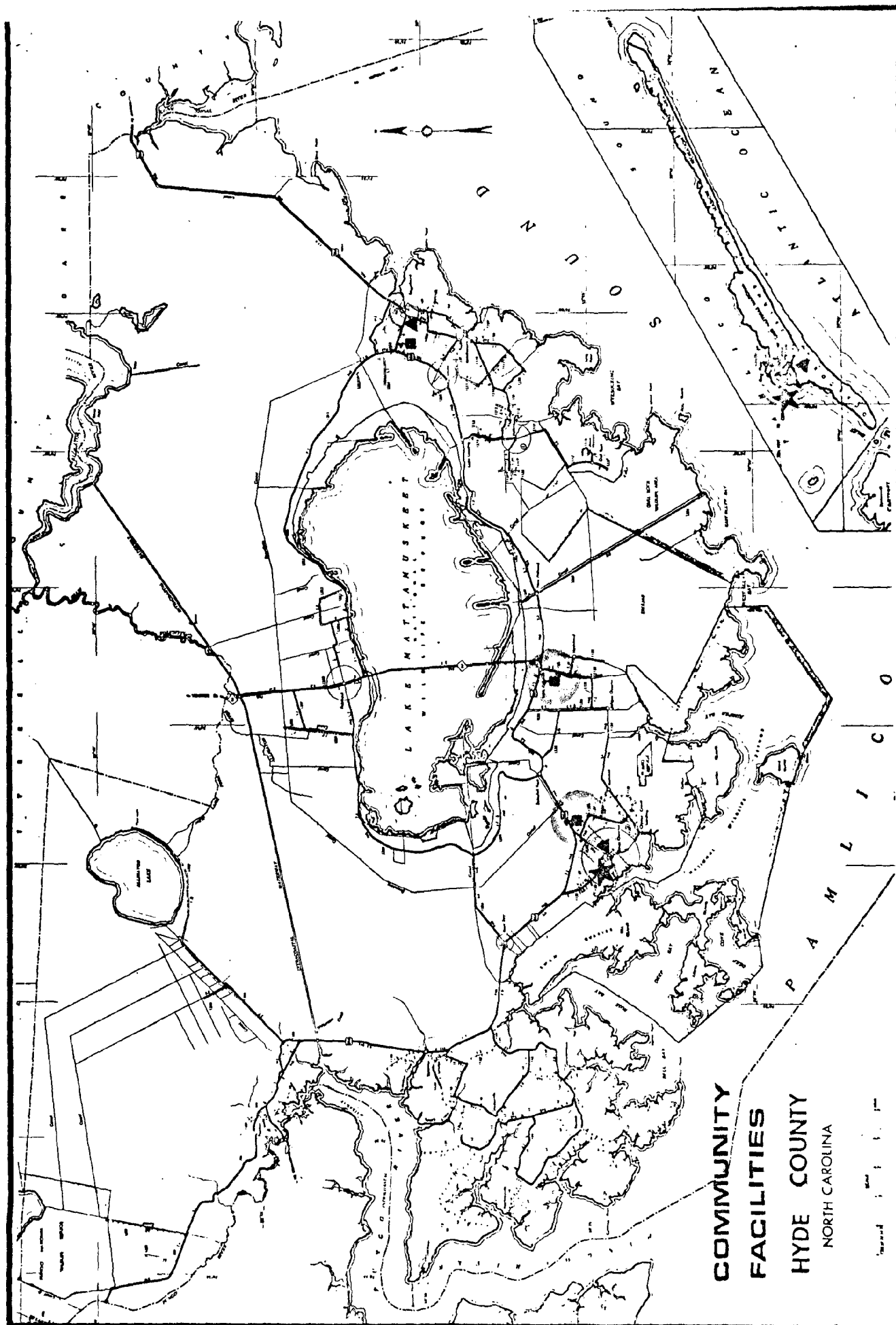
PUBLIC SCHOOLS



FIRE STATIONS



POLICE STATIONS



utilization of space within the building. The building was constructed in 1971.

The only high school in the county is Mattamuskeet High School, located on the mainland near the intersection of U. S. 264 and N. C. 94. The current enrollment of the school is 540 with a total capacity of 650. It appears, therefore, that excess capacity currently exists and that future classes from the elementary schools will not exceed the capacity of the facility.

There are, however, two particular considerations which may, in the future, affect the capacity of the county school facilities; they are a continued population growth in Currituck Township and constraints based upon transportation requirements. At the present time, the students in Currituck Township attend one of three schools - O. A. Peay Elementary, Pantego High School or Pungo Academy. In general, the majority of students north of the Intracoastal Waterway do not attend school in the county. A continued population growth in the township could place pressure upon the school system for additional facilities and/or equipment. The equipment would, no doubt, be in the category of mass transportation. Due to the location of the school facilities and the many populated areas of the county, transportation of students via buses is required. Therefore, if additional areas become significantly populated, requiring bus service, the end result may necessitate the purchase of additional vehicles. At the present time, the county school system operates and maintains twenty-seven (27) buses, providing transportation to 1,071

of the county's 1,231 students.

#### Primary Road

There are two roads in the county which may be considered "primary roads". One is U. S. 264 a two-lane thoroughfare which traverses the county east and west. The second is N. C. 94, also a two-lane road running north and south providing access across Lake Mattamuskeet through Fairfield to Tyrrell County. N. C. 94 is a north/south connector between U. S. 264 and U. S. 64.

Each road has a design capacity of approximately 400-500 cars per hour, or 5,700 to 8,200 vehicles per day. The most recent traffic count figures published by the North Carolina Department of Transportation (1974) reflect that U. S. 264 and N. C. 94 are lightly utilized at present. For example, the average daily traffic count on N. C. 94 at the Fairfield bridge is 380 vehicles, only .05 percent of total capacity. Therefore, in comparison, almost unlimited traffic generation may be sustained by the road based upon its present design capacity. The utilization of N. C. 94 does increase slightly to 850 vehicles per day when measured at the intersection of N. C. 94 and S. R. 1305.

Like N. C. 94, U. S. 264 has relatively low traffic flows. Unfortunately, the counting procedures do not provide directional flow information. Based upon present utilization, vehicular congestion is not a problem. For example, at the N. C. 94 and U. S. 264 intersection the average daily traffic volume on the

east side was 1,050 vehicles while on the west side, toward Swan Quarter, the daily vehicle count is slightly higher at 1,200. Utilizing the higher figure, this represents a 17 percent use of the roads total capacity. It may be assumed that the primary roads in Hyde County are not presently approaching the point where expansion is warranted based upon traffic count information.



## THE FUTURE: FORECASTS AND PROJECTIONS

## Estimated Demand

This segment of the land use plan is oriented toward the future and what perhaps may be in store for the county in the next couple decades. This discussion will include an evaluation of the future population and economy, future land needs and potential community facilities demand. The significance of this section is, that based upon certain projections and forecasts, the county may be able to better prepare for the future; and, if necessary, reorder spending allocations or other priorities.

### Population Projections

Future population projections are important with respect to forthcoming development; however, it is equally important that these projections are not taken out of context. They are only predictive in nature, and in many cases, extensions of past county demographic experiences. They are not ironclad; and, due to many unforeseen events, it is difficult to predict the exact future population level of the county. Although, through periodic updating, future population trends may be fairly accurate. All population projections take into account the following factors: birth rates, death rates, age structure of the present population and migration rates.

Three different population projections have been developed for Hyde County by the N. C. Department of Administration. All arrived at different conclusions. These differences result from weighing certain factors more than others. For example, the

following projection reflects that approximately 621 persons may be expected to leave the county between 1970 and 2000 and will not be replaced by new residents.

TABLE XII

HYDE COUNTY POPULATION PROJECTION

<u>YEAR</u>	<u>POPULATION</u>
1970	5,571
1980	5,397
1990	5,205
2000	4,950

N. C. Department of Administration, Raleigh, N. C., 1975

A second projection by the Carolina Population Center for the Office of State Planning similarly indicates that the county's population will decline to 5,200 by 1980. This would represent a 6.5 percent decline in population, accelerating the rate of decline experienced between 1960 and 1970 of only 3.4 percent.

Population trends for the past thirty years indicate that the rate of population decline in the county was beginning to level off with the most recent decline recorded of 3.4 percent. Thus, in accordance with past demographic experience, the knowledge of certain economic factors such as the Ocracoke-Swan Quarter Ferry, the expansion of the mainland's water supply system and the new water system for Ocracoke moderate population projection has been selected by the Hyde County Land Use Committee for the county. The projections for the county are by township and are significant from the standpoint that they are utilized by the

United States Environmental Protection Agency to evaluate sewage treatment plant grant applications.

TABLE XIII

HYDE COUNTY POPULATION PROJECTIONS BY TOWNSHIP

<u>TOWNSHIPS</u>	<u>YEAR</u>					
	<u>1950</u>	<u>1960</u>	<u>1970</u>	<u>1980</u>	<u>1990</u>	<u>2000</u>
Currituck	1,319	1,128	1,133	1,100	1,110	1,080
Fairfield	676	573	541	500	490	450
Lake Landing	2,628	2,453	2,377	2,540	2,710	2,780
Ocracoke	509	475	541	600	670	720
Swan Quarter	1,347	1,121	958	930	890	830
Unorganized Territory	-	15	21	30	40	50
COUNTY TOTALS	6,479	6,765	5,571	5,700	5,900	5,910

This projection indicates that the county will realize a gradual population increase through the year 2000. The six (6) percent overall gain by 2000 reflects that the county's population will stabilize and show moderate gains annually. With respect to individual townships, the table relates that population gains may be expected in Ocracoke and Lake Landing.

In general, however, the projections are predictive of county and township totals and not necessarily for specific locations and densities. For example, the initiation of ferry service between Ocracoke and Swan Quarter may cause an increase in the village populations although the total Swan Quarter Township population could reflect an overall decline. This could occur if people living in the other portions of the township

move to the Village of Swan Quarter taking advantage of new business opportunities rather than working in agriculturally related activities.

Although the population projections are indications of future resident populations, they do not in any way aid in the forecasting of seasonal population increases. As noted previously, the seasonal population increases are associated with summer vacationers, sports enthusiasts and migrant workers. The past experience regarding vacationers and sports enthusiasts reflects annual increases. This trend will no doubt continue, especially on Ocracoke Island. As the new ferry becomes operational, the mainland portion of the county will probably begin to experience annual increases in tourism. The length of the individual tourist's visit is dependent upon available accommodations and other amenities and at the present time, the mainland does not have an abundance of tourist motels, restaurants and alike. The likelihood of a dramatic change in this area is unlikely due to sewage disposal inadequacies. Until this situation is altered, seasonal tourist population increases on the mainland will probably not be significant.

With respect to the population, fluctuations resulting from migrant workers will most likely continue; however, due to a growing emphasis upon mechanization, the aggregate number of workers may reflect an annual decline. The prospect that the number of migrant workers will increase is slight due to the technology and other labor saving advances.

In general, the population projections for the county which reflect that approximately 5,700 people may reside within the county by 1980 is totally in agreement with the desires of the county residents. This complies with their desire that the county experience slow, but gradual growth. If the figures are accurate, it would appear that few, if any, environmental problems would result.

### Carrying Capacity

A specific issue regarding future growth and development concerns the capability of the land and water to sustain these changes. The carrying capacity of an area means the amount of life a stable ecosystem can support. Although an ambiguous definition, the issue requires that planning must take into consideration the physical limits at which certain levels of human activity lead to undesirable alterations in the environment. In the coastal area these detrimental effects are caused particularly by sewage and waste water disposal. The effects are noted in both ground and surface water quality; both, then, act as a physical limitation upon development. These physical limitations are fully developed in this land development plan under the topics of "constraints" and "significant land use compatibility problems...which have implications for future land use." The "estimated demand" section also notes these limitations.

The primary problem is caused by poor soil conditions, which are not conducive to on-lot disposal techniques. Specifically, the problem is that the soils either do not perk due to a high

water table or, as in the circumstances of Ocracoke, the soils perk too fast, not having an opportunity to remove toxic wastes. Then these wastes are transmitted to adjacent bodies of water ultimately causing degradation of water quality. Although the present conditions may not be causing serious water quality problems, the implications are magnified by potential increases in both population and economic activity.

### Economic Projections

This section will evaluate various economic trends which have and are occurring in Hyde County. The production and distribution of goods and services creates employment opportunities and may impact upon land use by creating demands for new residential and/or commercial activities. The economic status of the county, thus, may condition the developmental activity which may or may not be expected to occur. An expanding economy with new businesses and industries has associated growth implications for land uses. Conversely, a stagnant or contracting economy will not impact greatly upon existing land uses, especially in terms of new uses and additional requirements.

The Hyde County economy has experienced significant changes since 1930 when a majority of the labor force was actively engaged in agricultural production. This is not the case today, although the status of agricultural production has not diminished, continuing to be the primary income producer in the county. Technological innovations and the mechanization of agricultural production techniques are principally responsible for the labor

force realignment in the county. The following table illustrates the changes in the labor force which have occurred since 1930.

TABLE XIV

CIVILIAN LABOR FORCE, PERCENT EMPLOYMENT BY ACTIVITY

<u>YEAR</u>	<u>ACTIVITY AGRICULTURE</u>	<u>MANUFACTURING</u>	<u>INDUSTRY OTHER THAN AGRICULTURE AND MANUFACTORY</u>
1930	65.0	3.1	31.9
1940	61.1	2.8	36.0
1950	43.8	5.9	50.2
1960	37.8	10.3	51.9
1970	26.8	17.4	56.6

SOURCE: N. C. Population Trends, Vol. 3, 1974

As illustrated in the previous table, there has been a steady decline in the number of individuals engaged in agricultural production. As the same time, the county has experienced an increase in the size of the average farm. This may be directly related to technological advances. Mechanization of agriculture has accounted for much of that change, resulting in fewer people needed to operate farms. In 1930, the average farm in Hyde County was approximately 62.5 acres increasing to 179.9 acres in 1959 and by 1969 the average farm was 270.3 acres. This ranked Hyde County second in the state in terms of average farm size in 1969. Conversely, the percentage of the labor force employed in manufacturing activities has increased from 3.1 percent to 17.4 percent in 1970. Manufacturing employment activities



include logging and wood products, food and kindred products, dairy products and meat products.

Impressive gains have also been realized in the public utilities, service, trade, government and all other non-agricultural employment. Since 1930, this sector of the labor force has realized an increase from 31.9 to 56.6 percent by 1970.

These trends, however, do not completely reflect the employment disposition since 1930. Although significant changes have occurred within the labor force, it must be also recognized that the aggregate size of the labor force has also declined, and at the same time growing older. These factors have resulted from the steady population decline and out migration of the younger age segments of the populus. The result is an aging labor force which is not capable of renewing itself with younger workers entering the labor force.

The outlook for the county's future economic condition is bright. There are two developmental activities which will have the most positive implications upon the economic structure of the county. They are first, the initiation of ferry service between Ocracoke and Swan Quarter; second, benefits may accrue to the county resulting from improvements to Wanchese Harbor. The general implications of the ferry have been noted previously. In summary, however, it is generally felt that the greatest impacts will be realized on the mainland and more particularly in the Swan Quarter area. The long term implications center on additional commercial development and some additional residential expansion as well.

The economic implications of the improvements to Wanchese Harbor are equally significant. Plans indicate that there are to be a new harbor complex and improved access to fishing areas. A total investment of state and federal funds of approximately \$20 million is currently anticipated. The direct result of the harbor improvements will be better facilities for commercial fishermen, and it is estimated that total North Carolina landings could increase 33 percent. These increased landings will result from off-shore as well as sound side fishing and with increased catches, the need for processing will be obvious. One natural location for processing of shell and fin-fish would be Engelhard. Recently, one company has decided to locate in the county while others are investigating the available opportunities. It has been estimated that total revenues from the harbor improvement could approximate \$10 million annually.

## Future Land Needs

The previous section of this study briefly discussed future projections of population and economic changes which the county may experience. These changes may also have impacts upon the present land use patterns. The object of this section is to evaluate these changes as they may affect the following activities: residential, commercial and industrial land uses as well as agricultural and forestry production.

### Residential Land Use

The aforementioned projections suggest that population increases are likely in two townships - Lake Landing and Ocracoke, while a population shift may occur within Swan Quarter Township. If these projections are realized, additional land will be utilized for residential activity. In Lake Landing Township it may be reasonably expected that the increases will occur in the vicinity of Engelhard. Perhaps the most appropriate areas for this increase are on the south side of U. S. 264 between S. R. 1311 and Engelhard proper and in the area between Engelhard and Middletown on S. R. 1103, extending south to S. R. 1103. If there is a limiting factor upon residential activity in the township, it is associated with sewage and waste water disposal. Generally the soils of the area are not conducive to on-lot disposal of sewage. Therefore, prior to the construction of residential units, individual lots must be tested for suitability with regard to sewage disposal.

Ocracoke Township has also been identified as a potential growth area in the county. If present trends continue, this growth will include both seasonal and full-time residents. If these increases are realized, and in light of the proposed central water system, the most appropriate growth areas will be within the boundaries of the water service district. In Ocracoke, as in Engelhard, the disposal of sewage and waste water may pose a significant problem. Although the soils are different on the island and readily absorb waste water, the problem centers on the treatment aspects of the soil. The absorption rate is so fast that the treatment of pollutants does not occur with a majority of the untreated wastes being deposited in the waters adjacent to the island. In turn, this experience may cause a degradation of water quality standards. Again, health officials may require alternative waste water disposal techniques.

The circumstances in Swan Quarter center upon the impact of the ferry on the Village of Swan Quarter. Should the ferry result in increased residential activity in the vicinity of Swan Quarter, it may be expected that the activity will be centered along existing streets within the village and in the area east of S. R. 1129. The density of residential development, again, will be conditioned by the ability of the soils to absorb and treat waste water and sewage disposal. As with the remainder of the county, no central disposal system exists and on-lot disposal techniques must be employed.

A significant factor regarding new residential activity is

the form which this activity will take: multi-family units, single-family units, and/or mobile home units. Due to the existing constraints concerning sewage disposal, the prospects for multi-family units is not good. Therefore, one may assume that most residential activity will be allocated between the traditional single-family house and mobile homes. Recent experience reflects a growing trend in the county toward the utilization of mobile homes rather than the more expensive conventional single-family home. If the present economic conditions remain, it may be assumed that the trend toward mobile home units will continue and increase in the future.

#### Commercial Land Use

There are two factors which may impact upon the commercial activity and commercial land use patterns - the Ocracoke-Swan Quarter Ferry and the improvements to Wanchese Harbor. Perhaps the most immediate impacts upon commercial activity will be realized with the initiation of the new ferry service; long-term commercial impacts may occur with respect to Wanchese Harbor. In general, a majority of commercial increases will probably occur in Swan Quarter and Engelhard and to a lesser degree in Ocracoke. The commercial increases in Swan Quarter will probably relate to the tourist industry with the extent of development being proportional to the utilization of the ferry by tourists and their activities prior to departure and subsequent to their disembarkation.

Engelhard may also accrue economic benefits resulting from

the ferry; however, the improvements to Wanchese Harbor provide a better opportunity for increased commercial activity. The effect of the harbor improvements is expected to cause increased commercial fishing in the Pamlico Sound and the need for seafood processing facilities. With a little effort, Engelhard could feasibly become a center for this activity. In addition to the seafood industry, increased agricultural activity north of Engelhard may also bring additional economic activity to the village.

Throughout the remainder of the county, increased commercial activity may occur, however, at a slower rate than in Engelhard and Swan Quarter. That increase will probably be primarily related to agricultural production and consumer convenience stores. Commercial activities related to agricultural production may also be expected to occur in the Ponzer area, specifically relating to grain storage and livestock production.

#### Industrial Land Use

The prospects of large industrial type activities locating in the county in the near future are remote. At the present time, constraints imposed by the transportation system, sewage disposal and a skilled work force almost preclude large industrial location within the county. However, small industrial activities which do not require large numbers of skilled laborers could quite possibly locate in the county. However, the economic and population projections do not indicate an industrial expansion in the county. This does not include commercial fishing

processing activities.

#### Agricultural Land Use

Agricultural production in the county will, no doubt, continue to be one of the most important income producers in the future. The acreage which is presently being cleared and prepared for agricultural production may nearly double the acreage devoted to agricultural production. Primarily, the greatest acreage being prepared is in Lake Landing Township by American Cyanamid, Incorporated and by First Colony Farms, Incorporated in Currituck Township, located north of the Intracoastal Waterway to the Washington and Tyrrell County lines. In addition to these corporate land preparation activities, individual land owners are engaged in site preparation activities. This indicates that additional increases in agricultural receipts may be expected to continue in the future. With increased income, agriculturally related commercial activity may also be expected to increase, specifically related to mechanized machinery sales and service as well as grain storage facilities.

Increases in livestock production have been experienced in recent years and this trend may also be expected to continue. Past trends indicate increasing cattle and swine production activities.

#### Forestry Production

The land clearing activities currently taking place in the county will have dramatic implications for the forestry industry in the future. Initially, the impact is one in which the

forestry receipts increase; then, as the land is placed in agricultural production, forestry receipts decline. Commercial, long-term forestry is located primarily in Currituck Township, operated by the Weyerhaeuser Corporation. The corporation owns approximately 35,000 acres in the county with a majority of the acreage being located west along the banks of the Pungo River continuing along the southwestern shores of the county adjacent to the Pamlico Sound.



## Future Community Facilities Demand

With increases in the county's population and economic activity projected, increased demands upon the public utilities may reasonably be expected - particularly in the areas of water service and sewage disposal. This section will briefly analyze the implications of these demands upon existing and proposed services.

The county's water supply system has been evaluated and discussed previously in this report. Briefly, those findings reflected that the water supply system for both Engelhard and Swan Quarter were more than adequate. Present utilization of both systems allowed for a fifty (50%) percent increase, by volume, of the two systems. The new well field and lines extending from the Fairfield community are to link up with the existing systems and will thus increase the volume capacity of the total system. Therefore, the projected increase in population and economic activity should not pose capacity problems for water supply capabilities.

In addition to the mainland water systems, a contract has been signed to initiate construction of a central water supply system for the residents of the Village of Ocracoke. Utilizing a desalinization process, the new system will provide adequate water supplies for not only the full-time residents but also the tourists which annually visit the island every year.

The disposal of sewage and waste water, on the other hand, may become a significant issue in the near future. At the present time, the utilization of on-lot sewage disposal is universal, with septic tanks being the principal technique. The greatest impact of new regulations, both state and federal, will occur in the county's existing population centers - Swan Quarter, Engelhard and Ocracoke. The impact of these regulations will affect anywhere in the county where residential lot sizes are one quarter acre in size or less.

The primary problem is caused by the soil conditions which are not conducive to on-lot disposal techniques. Specifically, the problem is that the soils either do not perk due to a high water table or, as in the circumstances of Ocracoke, the soils perk too fast not having an opportunity to remove toxic wastes from the waste water. In turn, these wastes are transmitted to adjacent bodies of water and may ultimately cause a degradation of water quality. Although the present conditions may not be causing serious water quality problems, the conditions are magnified by potential increases in both population and economic activity.

## LAND CLASSIFICATION SYSTEM

## Plan Description

This element of the document is a designation of areas which have not only experienced development, but also those areas where future development ought to take place. Conversely, the element also denotes those areas where conservation practices should be instituted thus insuring that the valuable biological systems and aesthetic character of the coast will continue. The major portion of this discussion is devoted to the land classification system.

The State of North Carolina Land Classification System contains five classes. The five classes provide a framework to be used by local governmental units to identify the general use of all lands in each county. The land classification system may also assist in the coordination of state and local policies, standards and regulations. The significance of the system is fivefold:

- . The classification system will tend to encourage coordination and consistency between local land use policies and those of the state government;
- . The system provides a guide for public investment in land for school sites, transportation improvements, recreation facilities and other public facilities;
- . The system may provide a useful framework for budgeting and planning of community facilities such as water lines, sewage disposal facilities and new roads;
- . The system will aid in an improved regulatory system between federal, state and local agencies in areas requiring such regulations; and
- . The system may assist local governments in providing guidance for a more equitable distribution of the land tax burden.

## The Land Classification System

The land use classification system is composed of five (5) elements, each representing various degrees of development. The elements are: developed, transition, community, rural and conservation and are defined as follows.

DEVELOPED - Developed lands are areas with a minimum gross population density of 2,000 per square mile. At a minimum, these lands contain existing public services including water and sewer systems, educational systems and road systems--all of which are able to support the present population and accompanying land uses including residential, commercial, industrial and institutional.

TRANSITIONAL - Transitional lands are those with a moderately high density in which growth is to be encouraged and where any such growth that is permitted by local regulation will be provided with necessary public services. Lands to be considered in the transitional class shall be those which presently have a gross population density of 2,000 people per square mile but lack public services thus not qualifying for the developed class; or lands which have all the necessary public services in place but which lack the gross population density required, and all additional lands necessary to accommodate the remainder of the estimated transitional growth.

COMMUNITY - The community class identifies existing and new clusters of low density development not requiring major public services. This class will also provide for all new rural growth which only requires minor public services and can utilize on-lot disposal techniques of sewage and waste water disposal.

RURAL - The rural class identifies land for long-term management for productive resource utilization, and where limited public services will be provided. Development in such areas should be compatible with resource production.

CONSERVATION - The conservation class identifies lands which should be maintained essentially in its natural state and where very limited or no public services are provided. These lands are least desirable for development due to the environmental characteristics which make them either biologically or aesthetically valuable.

The Developed areas as defined above should ideally be lands where existing population density is moderate to high and where there are a variety of land uses. In addition, these areas should have the necessary public services. With respect to Hyde County, a strict interpretation of the definition would necessarily signify that developed areas do not exist. Upon a visual inspection, however, this simply is not fact; there are four areas of the county which are considered developed by the county residents. These areas are or shortly will be serviced by central water supplies, and each area has a definite

commercial and residential area. Specifically, these areas include portions of Swan Quarter, Engelhard, Ocracoke and Fairfield. On the classification map, these areas are denoted by a solid rust color.

The significance of these areas is that continued development or redevelopment should be encouraged, thus providing for the orderly growth of the area. The one major deficiency of the developed areas in the county is, however, that they do not have central waste water disposal facilities. Thus, for Hyde County, continued growth will be highly dependent upon waste water disposal criteria and techniques until central services are available.

Transitional areas are those which may or could be expected to accommodate moderate to high density development within the next decade, based upon the population and economic projections. In addition, these areas must be capable of being served by necessary utilities. The transitional lands are denoted by a hatched rust color; the classification map denotes the three areas are designated as transitional: Swan Quarter, Engelhard and Ocracoke.

One portion of the transition area in the vicinity of Swan Quarter has been designated by the Board of County Commissioners in a resolution adopted August 4, 1975. The resolution denotes that an area between the Ben Martin Ditch and the Oyster Creek Landing be designated as a commercial development area. Although the natural habitat of the area is marshland, the county is of the opinion that the best use of the area would be for commercial

purposes. The area in question contains approximately 680 acres of marsh; however, when compared to the county's total marshland acreage in excess of 29,000 acres, it would appear that the impact of development upon the county's marsh production would be minimal at most.

The area was designated appropriate for development because of two principal factors: the desire to expend the county influence in the commercial fishing and sports fishing industries as well as the recognition that the ferry terminal for the Ocracoke-Swan Quarter ferry was to be located in the area. The location of that complex would place obvious pressures upon the county and various regulatory agencies for development. The county also recognizes the spirit with which the Coastal Area Management Act was adopted. That spirit was not to prohibit development within marshland areas, but rather to plan for the protection of this productive resource. Thus, by planning now for the future, the productivity of the marshland areas could be insured. The residents of Hyde County do not believe that the goal of the Act was to protect every blade of marsh grass.

In addition, certain development standards imposed upon land use changes virtually protects areas from development which could cause environmental degradation. For example, based upon current regulations, the only types of development that may occur in the marsh are those which are water related. This means seafood processing and fish houses, like shrimp and oyster companies, and marinas. This, however, does not grant the developer the right to fill in marsh areas by spoil deposits. Any spoil must



be removed and placed on high ground. Thus, the marshland area will, no doubt, continue to exist, although there will be a decrease in its productivity in direct proportion to its removal. Due to the aggregate size of the county's marshlands, the developmental impact upon total marsh production in the county will, no doubt, be insignificant.

The Swan Quarter area imposes one more significant restriction upon future development, namely sewage disposal. A developer may meet all other criteria and protect the marsh from destruction from spoil and still not be permitted to proceed with construction, until adequate sewage disposal is accomplished. Therefore, the net amount of development which may occur on the south side of S. R. 1128 will be relatively little until central sewage disposal techniques are developed.

The county notes that developmental pressure will be equally significant on the north side of S. R. 1128 from Oyster Creek Landing to the developed area of Swan Quarter. Unlike the south side of S. R. 1128, this area would, no doubt, include both residential and commercial activity. Again, the sewage disposal issue is paramount, affecting commercial activity more than residential.

The transitional area in the Engelhard area duplicates the complexities previously noted in Swan Quarter. Due to the improvements to Wanchese Harbor, the area may accrue secondary benefits of seafood processing plant expansion. Thus, in anticipation of that potential expansion of the seafood related

business, approximately 225 acres of marshland areas have been designated appropriate for such development. The area, as denoted on the Classification Map, is located south of U. S. 264 from a point near the intersection of S. R. 1101. In addition to that area of marshland designation, an area between S. R. 1101 and S. R. 1103 was also designated as appropriate for developmental purposes.

Once again the principle consideration is sewage disposal. It has become obvious to the residents of the county that in order for any development to occur, sewage disposal inadequacies must be improved. If a satisfactory solution to this problem is not found, then the prospect of guiding growth appears unlikely or difficult at best. Thus, it is almost impossible to accurately document the number of structures which may be permitted in the transition area.

The transition area in Ocracoke does not include any marshland areas, although the sewage disposal problem is equally as significant and perhaps more difficult to find an adequate solution. The transition area conforms to the water service boundary as published in the Ocracoke Village Land Use Development Potential Study. The total number of dwelling units and commercial structures which may be permitted to locate on the island is highly dependent upon the health department regulations regarding on-lot disposal of waste water.

There are several community classifications located throughout the county. As noted previously, the community class

identification denotes existing and new clusters of low density of development not requiring major public services. With respect to those areas designated as "community" the Ponzer, Sladesville, Scranton and Rose Bay areas are probably the most likely to reflect population gains in the future. The "State Guidelines" state that these areas should not require major public services; however, as a result of the county-wide water supply system, all the community areas, with the exception of those in the Ponzer area, will have access to public water supplies.

The Rural classification denotes lands that are or will be utilized primarily for agricultural or forestry endeavors. By definition, a majority of the county's land area falls into this classification. Although designated for agricultural and forestry use, this classification does not exclude limited development. On the other hand, however, large scale development should be directed to those areas where necessary and adequate services are available.

The conservation class, unlike the other elements of the land classification system, is inappropriate for development due to either the existence of natural or man-made hazards or the quality of the natural environment is defined as a fragile area. The lands within this class are those which should be maintained in a natural state and where very limited or no public services, for example roads, are provided.

**POTENTIAL AREAS OF  
ENVIRONMENTAL CONCERN**

The North Carolina Coastal Area Management Act of 1974 requires that particular attention be given to the protection and appropriate development within Areas of Environmental Concern. It has been noted that the coastal area, and the estuaries in particular, are among the most biologically productive regions of this state and of the nation. However, recent years have witnessed increasing pressures for development within these areas resulting in conflicting needs and desires of society. One goal of the Act is to attempt to control these pressures by coordinated management, thus perpetuating the very features of the coast which make it economically, aesthetically and ecologically rich.

This section is, therefore, devoted to the identification of areas within the county which fall in the Area of Environmental Concern (AEC) classification. For purposes of clarification, this plan will recommend to the Coastal Resources Commission those areas of the county which, by definition, may be considered as appropriate for designation as an Interim Area of Environmental Concern. The Commission, after deliberate review and discussion at a later date, will designate the permanent AEC's. Several different types of land conditions exist within the county and may be considered as appropriate for inclusion in the Area of Environmental Concern classification. They are - coastal wetlands, estuarine waters, public trust waters, areas that sustain remnant species and complex natural areas.

### Coastal Wetlands

The guidelines defined coastal wetlands as "any salt marsh or other marsh subject to regular or occasional flooding by tides, including wind tides (whether or not the tide waters reach the marshland areas through natural or artificial watercourses), provided this shall not include hurricane or tropical stormtides. Salt marshland or other marsh shall be those areas upon which grow some, but not necessarily all, of the following salt marsh and marsh plant species: smooth or salt water Cordgrass (Spartina alterniflora); Black Needlerush (Juncus roemerianus); Glasswort (Salicornia spp); Salt Grass (Distichlis spicata); Sea Lavender (Limonium spp); Bullrush (Scirpus spp); Saw Grass (Clandium Jamaicense); Cat-Tail (Typha spp); Salt Meadow Grass (Spartina patens); and Salt Reed Grass (Spartina cynosuroides). The definition further divides all wetlands into two subcategories: low tidal marshlands, defined as those consisting of primarily Spartina alterniflora, usually subject to inundation by the normal ebb and flow of lunar tides; and other coastal marshlands defined as those not included or defined as low tidal marshlands."

A previous discussion in the section titled, Constraints, evaluates the extent and character of the county's wetland areas. Therefore, this discussion will concern the policy objectives and appropriate land uses in areas defined as "other coastal marshlands."

Policy Objective - To give a high priority to the preservation and management of the marsh so as to safeguard and perpetuate their biological, economic and aesthetic values.

Appropriate Land Uses - Appropriate land uses shall be those consistent with the above policy objective. Highest priority shall be allocated to the conservation of existing marshlands. Second priority for land use allocation of this type shall be given to development which requires water access and cannot function anywhere else, such as ports, docks and marinas provided that the actual location of such facilities within the marsh consider coastal, physical and biological systems; and further provided that feasible alternatives regarding location and design have been adequately considered and need for such development can be demonstrated. Such allocation may only be justified by the projected land use demands and by community development objectives but in no case shall the allocation exceed the capacity of the marshland system to sustain losses without harm to the estuarine ecosystem unless the losses would be offset by a clear and substantial benefit to the public.

#### Estuarine Waters

The guidelines define estuarine waters as "all the water of the Atlantic Ocean within the boundary of North Carolina and all the waters of the bays, sounds, rivers and tributaries thereto seaward of the dividing line between coastal fishing waters and inland fishing waters, as set forth in an agreement adopted by the Wildlife Resources Commission and the Department of Conservation and Development filed with the Secretary of State entitled 'Boundary Lines, North Carolina Commercial Fishing Inland Fishing Waters, revised March 1, 1976', or as it may be subsequently

revised by the Legislature."

Policy Objective - To preserve and manage estuarine waters so as to safeguard and perpetuate their biological, economic and aesthetic values.

Appropriate Uses - Appropriate uses shall be those consistent with the above policy objective. Highest priority shall be allocated to the conservation of estuarine waters. The development of navigational channels, the use of bulkheads to prevent erosion and the building of piers or wharfs where no other feasible alternative exists are examples of land uses appropriate within estuarine waters provided that such land uses will not be detrimental to the biological and physical estuarine functions and public trust rights. Projects which would directly or indirectly block or impair existing navigation channels, increase shoreline erosion, deposit spoils below mean high tide, cause adverse water circulation patterns, violate water quality standards, or cause degradation of shellfish waters are generally considered incompatible with the management of estuarine waters.

An important aspect of the above statement which directly affects Hyde County concerns the degradation of shellfish waters. At the present time, the waters of the Pamlico Sound adjacent to the county are state oyster management areas and have natural populations of oysters, clams, scallops and shrimp. In recent years, the waters have experienced a degradation of water quality standards thus causing several areas of estuarine waters to be closed for harvesting. Among these closed areas are portions of the Pungo River, Rose Bay, Wysocking Bay and Engelhard Bay.



### Public Trust Waters

The Guidelines characterize public trust navigable waters as those areas in which the public has rights including navigation and recreation. By definition, navigable means "capable of being navigated in its natural condition by the ordinary modes of navigation including modes of navigation used for recreational purposes. The natural condition of a body of water for purposes of determining navigability shall be the condition of the body of water without man-made obstructions and without temporary natural obstructions. Temporary natural conditions such as water level fluctuation and temporary natural obstructions which do not permanently or totally prevent navigation do not make an otherwise navigable stream non-navigable."

The implications for Hyde County are that the waters of the Pungo River and tributaries north of Durants Point are classified as public trust waters. In addition, the waters of the Alligator River, south from the Cherry Ridge Landing in Tyrrell County and its tributaries are included in the public trust definition.

Policy Objective - To protect public rights for navigation and recreation and to preserve and manage the public trust waters so as to safeguard and perpetuate their biological, economic and aesthetic value.

Appropriate Uses - Appropriate uses shall be those consistent with the above policy objective. Any land use which interferes with the public right of navigation or other public trust rights shall not be allowed. The development of navigational channels,

drainage ditches, the use of bulkheads to prevent erosion and the building of piers or wharfs are examples of land uses appropriate within public trust waters provided that such land uses will not be detrimental to the biological and physical functions and public trust rights. Projects which would directly or indirectly block or impair existing navigation channels, increase shoreline erosion, deposit spoils below mean high tide, cause adverse water circulation patterns, violate water quality standards or cause degradation of shellfish waters are generally considered incompatible with the management of public trust waters.

#### Natural Hazard Areas - Estuarine and River Erodible Areas

The estuarine and river erodible areas have been characterized as the area above ordinary high water where excessive erosion has a high probability of occurring. In delineating the landward extent of this area, a reasonable twenty-five (25) year recession line shall be determined using the best available information.

Policy Objective - To insure that development occurring within these areas is compatible with the dynamic nature of the erodible lands thus minimizing the likelihood of significant loss of property.

Appropriate Land Uses - Appropriate land uses shall be those consistent with the above policy objective. Permanent or substantial residential, commercial, institutional or industrial structures are not appropriate uses in estuarine and sound and river erodible areas unless stabilization has been achieved along the affected reach. Recreational, rural and conservation

activities represent appropriate land uses in those erodible areas where shoreline protective construction has not been completed.

#### Complex Natural Areas

Complex Natural Areas have been identified as lands that support native plant and animal communities, providing habitat conditions or characteristics that have remained essentially unchanged by human activity. These areas are normally surrounded by landscapes that have been modified but in a manner which does not significantly alter the conditions within the natural areas, or their scientific or educational value.

Policy Objective - To preserve the natural conditions of the site so as to safeguard its existence as an example of naturally occurring, relatively undisturbed plant and animal communities of major scientific or educational value.

Appropriate Land Uses - Appropriate land uses shall be those consistent with the above policy objective. Lands within the AEC shall not be planned for uses or kinds of development that will unnecessarily jeopardize the natural or primitive character of the natural area, directly or indirectly, through increased accessibility. Additionally, lands adjacent to the complex natural area should not be planned for additional development that would unnecessarily endanger the recognized value of the AEC. The variability between kinds of complex natural areas and between land uses adjacent to those natural areas means that the range of permissible uses and intensity of use must be carefully tailored to the individual area.

## CONCLUSION

The preceding account has illustrated the formulation of our policy regarding land use and future development. The next steps concern the development of methods by which we can realize our goals and objectives, at the same time preparing for future growth. Basically, there are several options available including zoning, subdivision regulations, housing codes, capital improvement programming and perhaps the employment of a full-time planning staff. By using these tools, we can improve and protect various aspects of our life style while looking toward the future. These elements are more specifically developed below.

#### Zoning

County-wide or township zoning insures that various land uses within the county are properly situated in relation to one another and provides adequate space for each type of development. The zoning process involves the division of land into designated districts allowing for control of the density of development within the districts, compatible land uses and adequate public facilities including streets, schools, utility systems and other public services. The zoning process can direct new growth into appropriate areas and protects existing property owners and uses by preventing undesirable or incompatible uses which may tend to depreciate property values or curtail existing activities.

The adoption of a zoning resolution would become one tool for implementation of this document and should conform to the

various recommendations and objectives found herein. This relationship is very important since the land development plan represents county policy and what is considered the best use of land.

#### Subdivision Regulations

In addition to zoning, a subdivision control ordinance is a method of implementing the concepts of the land development plan. Subdivision regulations enables a jurisdiction to guide new development by establishing minimum standards of street design and construction, by determining what improvements in the form of utilities and drainage and site design shall be required. The regulation basically requires that the developer of a tract of land submit a plat for approval to the review agent of the county anytime the subdivision of land is to occur. Prior to approval, the plat should be reviewed by the local highway engineer and planning board to determine whether or not the plan conforms to adopted guidelines and policy. This process insures that the development of a new area will provide adequate utilities, they will function properly and thus the costs of new development are not born by the county but rather by the developer. The regulations, if properly enforced, protect all parties by insuring that all aspects of development have been evaluated.

#### Housing-Related Codes

The purpose of housing related codes is to protect the health, safety and welfare of the individuals by establishing minimum construction standards for all types of structures.

Housing-related codes include the following: building codes, housing codes, electrical codes, plumbing codes, utility codes and fire codes.

Hyde County has already adopted the State of North Carolina Building Code as a preliminary step to qualify for inclusion in the flood plain insurance program of the National Flood Insurance Administration. The limitation of the building code is that it only applies to new construction starts, and does not apply to existing housing conditions.

#### Sedimentation and Erosion Control Ordinances

The adoption of a sedimentation and erosion control ordinance would provide the legal means by which the local officials could insure that the water quality of streams and estuarine waters could be protected from sediment pollution resulting from development adjacent to these areas. The regulations provide for control of extensive vegetative removal thereby preventing erosion of the soil and resulting sedimentation in water bodies. Without some type of regulation for sedimentation, degradation of water quality standards could cause the closing of additional commercial fishing waters.

#### Capital Improvements Programming

A capital improvements program for the county would identify all new public improvements, their priority, costs, benefits, their location and timing for construction. A program of this type is updated annually and maintains a five year lead time,

thus allowing adequate time to insure that the most needed facilities receive the earliest consideration.

In addition to providing services to developed areas, the county may directly influence areas of new growth by directing public services to these areas. The extension of public services to an area is a method of encouraging growth in areas pre-determined suitable for such growth. The Land Use Plan identified potential growth areas, thus coordination with the capital improvements program may easily be accomplished.

#### Employment of a Full-Time Planning Staff

The employment of a planning staff is another tool which the county could utilize to implement the provisions of the Land Use Plan. Such a staff, or person, could make professional recommendations to local boards and elected officials upon which they could base their decisions concerning the orderly development of the county. In addition, the planning staff could provide assistance in the decision-making process regarding all ordinance enforcement.

The planning process which we have undertaken reflects that a certain amount of growth is likely to occur. Depending upon where and how much growth takes place will determine the need for new facilities and services which must be borne by those of us who live in the county. This means using our tax revenues and seeking sources of state and federal money when possible. Regardless, a portion of the cost of new growth ultimately



resides with us and it is important that we properly plan for that growth.

As stated, the plan is based upon our present desires; and if our desires change, then the plan should be changed too. Today, a majority of us would like to see the county experience moderate population growth and economic development but not to the expense of our natural resources or the character of our life style. This plan represents the work of many of us and we hope that you recognize and agree with the findings of this report.

## BIBLIOGRAPHY

## BIBLIOGRAPHY

- Albemarle Regional Planning and Development Program, Overall Economic Development Program, ARPDC, Edenton, N. C., November, 1971.
- Baker, Simon, Ed., Coastal Development and Areas of Environmental Concern, Chapel Hill, University of North Carolina Sea Grant Program, 1975.
- Barwick, Frank B. Critcher T. Stuart. Wildlife and Land Use Planning with Particular Reference to Coastal Counties, North Carolina Wildlife Resources Commission, Raleigh, N. C., April, 1975.
- Blake, J. G. Preparing for Change--The Population of the Albemarle Area, Department of Natural & Economic Resources, Washington, N. C., November, 1966.
- Board of Water and Air Resources. Rules, Regulations, Classification and Water Quality Standards Applicable to the Surface Waters of North Carolina, Raleigh, N. C.; Department of Natural & Economic Resources, 1972.
- Brockett, Richard. Regional Housing Evaluation and Analysis 1973-74, Albemarle Regional Planning & Development Commission, Edenton, N. C., May, 1974.
- Bureau of Employment Security Research, North Carolina Labor Force Estimates, Employment Security Commission of N. C., Raleigh, N. C., 1975.
- Carolina Population Center, Statistical Services Center. County Population Trends in North Carolina, 1790-1970, UNC and the N.C. Department of Administration, Raleigh, N. C., 1969.
- Clark, John. Coastal Ecosystems, Ecological Considerations for the Coastal Zone, The Conservation Foundation, Washington, D. C., March, 1974.
- Clawson, Dave. "Closed Fishing Waters of the Pamlico Sound", Department of Natural & Economic Resources, Shellfish Sanitation, Morehead City, N. C., 1976.
- Coastal Resources Commission. Handbook on Public Participation in the Development of Land Use Plans in the Coastal Areas of North Carolina, Department of Natural & Economic Resources, Raleigh, N. C., 1975.

Coastal Resources Commission. "State Guidelines for Local Planning in the Coastal Area under the Coastal Area Management Act." Raleigh, N. C. 1975.

Copeland, B. J., William L. Rickards, Dixie Berg. N. C. Coastal Resources and Short Term Research Needs, UNC Sea Grant, Raleigh, N. C., May, 1975.

Dawson, Amos. "Report on Land and Water Resource Use Problems Related to the Carrying Capacity of the Coastal Area of North Carolina." Coastal Resources Commission, Raleigh, N. C., 1976.

Division of School Planning, N. C. Department of Public Instruction. Hyde County Survey, Raleigh, N. C., 1975.

Employment Security Commission. North Carolina Commuting Pattern, 1960-1970, Employment Security Commission, Raleigh, N. C., 1974.

Endangered Species Committee, Department of Natural and Economic Resources. Preliminary List of Endangered Plant and Animal Species in North Carolina. Resources Management Section, Raleigh, N. C., June, 1973.

Fish, Frederic F., A. Catalog of the Inland Fishing Waters of North Carolina, Raleigh, N. C. Wildlife Resources Commission, 1969.

Freeman, W. F. & Associates. Region R Water Resources Management Plan. High Point, N. C., June, 1974.

Freeman, W. F. & Associates. Water Resource Management Region R, Office of State Planning, Department of Administration, Raleigh, N. C., 1975.

Heath, Ralph C. Hydrology of the Albemarle-Pamlico Region, U.S.G.S. and the N. C. Department of Natural & Economic Resources, Raleigh, N. C., 1975.

McCoy, Edward G. Dynamics of North Carolina Commercial Shrimp Populations, N. C. Department of Natural & Economic Resources, Division of Commercial and Sports Fisheries, Raleigh, N. C. Special Scientific Report No. 21, March, 1972.

McCoy, Edward G. and Connell E. Purvis. Population Dynamics of Brown Shrimp in Pamlico Sound, N. C. Department of Natural & Economic Resources, Division of Commercial & Sports Fisheries, Special Scientific Report No. 25, January, 1974.

Mewborn, Robert D. Ocracoke Village Land Use Development Potential Study, Regional Development Institute, Greenville, N. C., April, 1972.

Nelson, Perry F. Geology and Ground Water Resources of the Swan Quarter Area, N. C., N. C. Department of Water Resources Ground Water Bulletin No. 4, Raleigh, N. C., 1964.

North Carolina Coastal Area Management Act, N. C. General Statute 113A-100, 1975 as amended.

N. C. Department of Agriculture. North Carolina Agricultural Statistics, 1959, U. S. Department of Commerce, Washington, D. C., 1960.

N. C. Department of Transportation. Seven Year Highway Plan, N. C. Department of Transportation, Raleigh, N. C., 1975.

N. C. Soil and Water Conservation and Needs Committee. North Carolina Conservation Needs Inventory. United States Department of Agriculture, Soil Conservation Service, Raleigh, N. C., December, 1971.

N. C. Department of Administration. North Carolina State Government Statistical Abstract. Second Edition, Raleigh, N. C., 1973.

N. C. Department of Administration. Profile of North Carolina Counties, Raleigh, N. C., March, 1975.

N. C. Land Policy Council. A Land Policy for North Carolina, N. C. Land Policy Council, Raleigh, N. C., 1976.

Odum, E. P., Fundamentals of Ecology, W. B. Saunders Co., Philadelphia, 1971.

Ospina, E. and L. Danielson. North Carolina Land Use Data, N. C. Agricultural Extension Service, Raleigh, N. C., 1973.

Pamlico Soil and Water Conservation District. Swan Quarter Watershed Work Plan, Raleigh, N. C., February, 1965.

Riggs, S. R. and M. P. O'Connor. Geological Bibliography of North Carolina's Coastal Plain Coastal Zone and Continental Shelf, UNC Sea Grant Publication, Raleigh, N. C. June, 1975.

Rivers and Associates. Hyde County Comprehensive Water and Sewer Study, Greenville, N. C., 1968.

Rivers and Associates. Ocracoke Island: Ocracoke Sanitary District Preliminary Engineering Report, Greenville, N. C. 1971.

- Sharge, Bill. New Geography of North Carolina. Edward and Broughton, Raleigh, N. C., 1966.
- Soil Conservation Service, Shoreline Erosion Inventory of North Carolina, Raleigh, N. C., August, 1975.
- Soil Conservation Service, U.S. Department of Agriculture. Outdoor Recreation Potential for Hyde County, N. C., Pamlico Soil and Water Conservation District. Swan Quarter, N. C., June, 1974.
- Spellman, F. and R. Brockett. Overall Program Design Comprehensive Work Program 1974-1977, Albemarle Regional Planning Development Commission, Edenton, N. C., July, 1974.
- U. S. Department of Agriculture. U. S. Census of Agriculture, 1969. U. S. Department of Commerce, Washington, D. C., 1970.
- U. S. Department of Agriculture, Forest Statistics for the Northern Coastal Plain of North Carolina, 1974 Forest Service Resource Bulletin SE-30, Raleigh, N. C., September, 1974.
- U. S. Department of Commerce. U. S. Census of Agriculture, 1959. U. S. Department of Commerce, Washington, D. C., 1960.
- U. S. Department of Commerce, Bureau of the Census. County Business Patterns, 1971. United States Government Printing Office, Washington, D. C., May, 1972.
- U. S. Department of Commerce, Bureau of the Census, 1970 Census of Population (PC(1)C35NC) General Social and Economic Characteristics, United States Government Printing Office, Washington, D. C., 1972.
- U. S. Department of Commerce, Bureau of the Census, 1970 Census of Population-General Population Characteristics. (PC(1)BB5NC), United States Government Printing Office, Washington, D. C., 1972.
- U. S. Water Resources Council. OBERS Projections, Series E, Bureau of the Census, Washington, D. C., 1972.
- Wilkinson, Richard P. and R. Paul Darst. Critical Areas of North Carolina, N. C. Department of Administration, Raleigh, N. C., 1972.
- Wilson, Kenneth A., North Carolina Wetlands Their Distribution and Management. Raleigh, North Carolina Wildlife Resources Commission, 1962.
- Woodhouse, W. W., E. D. Seneca and S. W. Broome. Marsh Building With Dredge Spoil in North Carolina. Coastal Engineering Research Center, et. al. Raleigh, N. C., 1970.

